

PROPERTY OF
MAURO, CAMERON, LEWIS & MASSIE,
700 Tenth Street, N. W.,
WASHINGTON, D. C.

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ALPHABETICAL LIST
OF
PATENTEES.

61.5 P. 11-14

GRAPHOPHONE PATENT VOLUME 18.

January - June, 1917.



Adams, F.H.	1,212,872
Adams, P.H.	1,215,328
Amet, E.H.	1,221,407
Amet, E.H.	1,221,408
Amet, E.H.	1,222,348
Amet, E.H.	1,225,203
Angello, L.	1,224,995
Apostolopoulos, N.A.	1,224,352
Archer, H.W.	1,212,309
Aylsworth, J.W.	1,230,816

Barrows, F.L.	1,225,560
Barrows, F.L.	1,225,561
Bayer, E.C.	1,228,639
Becker, P.	1,223,927
Blessing, J.G.	1,227,523
Blood, B.B.	1,211,532
Bolton, A.	1,231,326
Bowen, Jr., G.H.	1,214,890
Boyer, W.R.	1,225,217
Bragdon, J.H.	1,211,066
Brexendorf, A.M.	1,226,301
Brown, H.H.	1,218,625
Brown, R.G.	1,221,003
Buelna, G., & Burson, A.E.	1,221,285
Bullis, H.C.	1,213,150
Burton, C.S.	1,227,579

Capps, F.L.	1,216,656
Capps, F.L., & Scully, J.J.	1,227,748
Cate, Clarence,	1,226,749
Cheney, Forest,	1,228,406
Cheney, Forest,	1,231,329
Cleveland, W.E.	1,223,149
Cleveland, W.E.	1,225,579
Comer, J.J.	1,230,676
Coy, A.E.	1,230,280
Coy, A.E.	1,230,281

De Vere, R.B.	1,223,041
De Selms, O.C.	1,222,607
Dean, W.W.	1,220,501
Dennison, W.N.	1,219,379
Dennison, W.N.	1,219,380
Dodge, P.	1,215,500
Dun Lany, W.P.	1,211,559

Duncan, R.	1,211,110
Dunbar, R.A.	1,217,723

Emerson, V.H.	1,213,468
English, J.C.	1,219,275
English, J.C.	1,222,371
English, J.C.	1,222,372
Epri, A.	1,220,967

Fechtenburg, J.F.H.	1,216,222
Fessenden, R.A.	1,213,176
Fessenden, R.A.	1,217,585
Fischer, A.	1,224,369
Frankel, E.T.	1,222,381
Fricke, O.	1,225,796
Frier, J.	1,228,014
Fritts, C.E.	1,213,613
Fritts, C.E.	1,213,614
Fritts, C.E.	1,213,615
Fritts, C.E.	1,213,616
Frittsch, P.	1,217,294
Frittsch, B.	1,223,338

Gibson, R.L.	1,228,901
Gibson, R.L.	1,228,902
Gillen, P.	1,226,607
Gollmer, E.	1,219,934
Griswold, E.J.	1,211,573

Hare, J.R.	1,223,970
Hartman, S.L.	1,227,536
Hayne, E.G.	1,223,387
Hess, H.W.	1,214,304
Hess, H.	1,222,626
Higham, D.	1,226,883
Hilliard, W.M.	1,216,691
Holland, N.H.	1,213,197
Holland, N.H.	1,229,749
Hocey, G.F.	1,211,584
Hunter, M.L., & Church, A.B.	1,216,232
Hunter, M.L., & Church, A.B.	1,230,485
Huseby, A.A.	1,224,301
Huseby, A.A.	1,224,547
Huseby, A.A.	1,228,115
Huseby, A.A.	1,228,116
Hutchings, F.W.	1,229,466

Ireton, A.F.	1,218,560
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Johnsen, J.A.	1,229,619
Johnson, E.R., & English, J.C.	1,217,869
Johnson, E.R.	1,229,469
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Jones, A.D.	1,220,638
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Jones, J.W.	1,219,325
Josephson, E.H.	1,218,408
Junod, A.	1,228,564

Karch, O.A.	1,222,408
Kitchen, J.M.W.	1,226,674
Kitsee, I.	1,213,883
Kocourek, H.	1,219,112
Kraemer, T.	1,223,889
Kraft, F.	1,214,181
Kulp, J.C.	1,229,197

La Rue, W.D.	1,223,080
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Lightfoot, W.L.	1,226,979
Lucker, W.A.	1,214,806

Mac Lane, S.R.	1,221,074
Mac Lane, S.R.	1,221,075
Mc Donald, Jr., E.F.	1,217,794
Mc Nulty, H.B.	1,221,072
Mc Vay, C.D.	1,219,975
Majorana, P.	1,219,752
Marshall, C.P.	1,214,050
Marshall, C.P.	1,231,277
Marshall, J.B.	1,219,753
Matthews, F.W.	1,210,665
Mercer, J.C.	1,221,348
Miller, H.C.	Reissue No. 14,257
Miller, H.C.	Reissue No. 14,305
Minns, G.L.	1,214,352
Moore, F.S.	1,229,775
Murray, H.H.	1,229,642
Myers, H.A.	1,224,091
Myers, H.A.	1,224,092

Nielsen, A.	1,222,974
Nolan, F.A.	1,230,505
Nolan, F.A.	1,230,506
Nolan, F.A.	1,230,763
Nolan, F.A.	1,230,764
Nolan, F.A.	1,230,765
Nolen, J.G., & Mc Elroy, R.L.	1,222,790

Opel, W.	1,229,780
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Palmer, C.	1,225,847
Para, J.	1,219,144
Pape, H.G.	1,218,799
Pemberton-Billing, N.	1,230,509
Pierman, A.N.	1,211,874
Pierman, A.N.	1,231,061
Plante, E.	1,230,324
Potts, W. C.	1,229,518
Prettie, R.J.	1,216,839

Ries, F.	1,222,139
Repp, C.B.	1,213,413
Repp, C.B.	1,215,410
Roever, J.	1,216,500
Roever, J.	1,216,501
Rosenbaum, H.	1,231,431
Ruckgaber, A.	1,212,692
Ruckgaber, A.	1,212,693
Rudert, P.	1,226,262

Saenger, O.	1,229,142
Samuels, M.J.	1,219,164
Scalbom, O.L.	1,224,215
Schiff, H.T.	1,231,435
Scotford, L.K.	1,216,614
Scotford, L.K.	1,225,505
Seelau, F.	1,222,895
Segal, H.	1,228,064
Severy, M.L.	1,218,324
Sharples, W.J.	1,229,330
Shelton, W.G.	1,217,843
Soons, J.E.	1,227,334
Stechbart, A.	1,230,614

Tanner, W.J.	1,215,744
Thomas, R.	1,229,346

Underhill, G.H.	1,227,023
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Von Madaler, F.	1,230,633
Valiquet, L.P.	1,224,979
Vansize, W.B.	1,219,682

Wade, S.O.	1,212,292
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Walter, E.C.	1,225,538
Ward, R.H.	1,210,875
Ward, W.S.	1,215,446
Weber, P.	1,220,480
Whitman, R.	1,223,545
Wolcott, N.B.	1,213,990
Woods, C.E.	1,213,443
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Woods, C.E.	1,218,918
Woods, C.E.	1,221,495
Woods, C.E.	1,226,839
Young, W.W.	1,224,102

NUMERICAL LIST
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PATENTS.

GRAPHOPHONE PATENT VOLUME 18.

January - June, 1917.

No. 1,210,665,	F.W. Matthews,
1,210,875,	R.H. Ward,
1,211,066,	J.H. Bragdon,
1,211,110,	R. Duncan,
1,211,532,	B.B. Blood,
1,211,559,	W.P. Dun Lany,
1,211,573,	E.J. Griswold,
1,211,584,	G.F. Hooey,
1,211,874,	A.N. Pierman,
1,212,292,	S.O. Wade,
1,212,309,	H.W. Archer,
1,212,692,	A. Ruckgaber,
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1,212,872,	F.H. Adams,
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1,213,176,	R.A. Fessenden,
1,213,197,	N.H. Holland,
1,213,413,	C.B. Repp,
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1,214,106,	C.E. Woods,
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1,214,304,	H.W. Hess,
1,214,352,	G.L. Minns,
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Reissue 14,257,	H.C. Miller,
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1,217,294,	P. Frittsch,
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1,217,723,	R.A. Dunbar,
1,217,794,	E.F. McDonald, Jr.,
1,217,843,	W.G. Shelton,

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1,218,408,	E.H.Josephson,
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1,219,112,	H.Kocourek,
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1,219,325,	J.W.Jones,
1,219,379,	W.N.Dennison,
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1,224,102,	W.W.Young,

1,223,338,	B.Fritzschn,
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1,226,301,	A.M.Brexendorf,
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1,226,883,	D.Higham,
1,226,979,	W.L.Lightfoot,
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1,227,523,	J.G.Blessing,
1,227,536,	S.L.Hartman,
1,227,579,	C.S.Burton,
1,227,748,	F.L.Capps & J.J.Scully,
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1,228,901,	R.L.Gibson,
1,228,902,	R.L.Gibson,
1,229,142,	O.Saenger,
1,229,197,	J.C.Kulp,
1,229,330,	W.J.Sharples,
1,229,346,	R.Thomas,
1,229,466,	F.W.Hutchings,
1,229,469,	E.R.Johnson,
1,229,518,	W.C.Potts,
1,229,619,	J.A.Johnsen,
1,229,642,	H.H.Murray,
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1,229,775,	F.S.Moore,
1,229,780,	W.Opel,
1,230,280,	A.E.Coy,

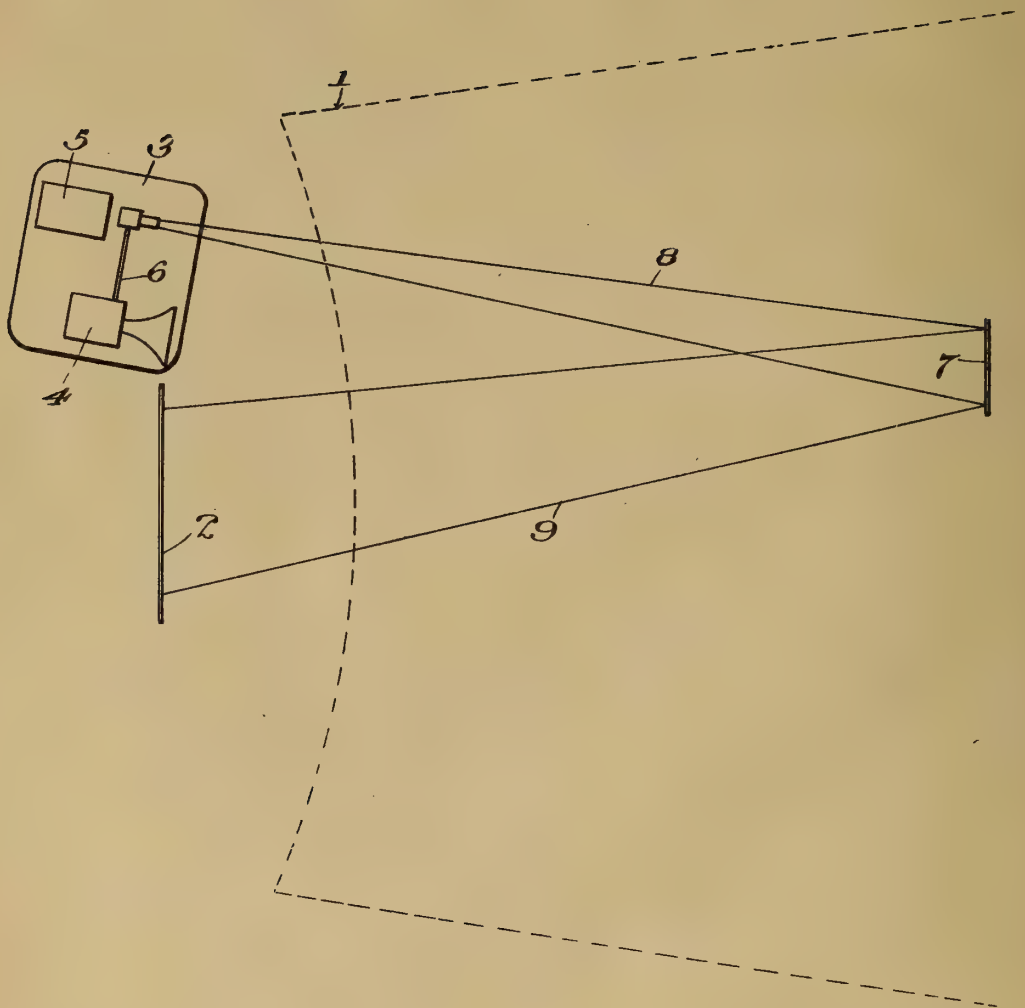
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1,230,485,	M.L.Hunter & A.B.Church,
1,230,505,	F.A.Nolan,
1,230,506,	F.A.Nolan,
1,230,509,	N.Pemberton-Billing,
1,230,614,	A.Stechbart,
1,230,633,	F.Von Madaler,
1,230,676,	J.J.Comer,
1,230,763,	F.A.Nolan,
1,230,764,	F.A.Nolan,
1,230,765,	F.A.Nolan,
1,230,816,	J.W.Aylsworth,
1,231,061,	A.N.Pierman,
1,231,277,	C.P.Marshall,
1,231,326,	A.Bolton,
1,231,329,	F.Cheney,
1,231,370,	E.R.Johnson,
1,231,431,	H.Rosenbaum,
1,231,435, 6/26/17	H.T.Schiff,

TALKING MOVING PICTURE APPARATUS,
#1,210,665-----F.W. Matthews,
Patented-January 2nd, 1917.
Filed-August 20th, 1914.

F. W. MATTHEWS.
TALKING MOVING PICTURE APPARATUS.
APPLICATION FILED AUG. 20, 1914.

1,210,665.

Patented Jan. 2, 1917.



Witnesses:
Lute A. Allen,
Sully Russo

Inventor:
Frederick W. Matthews,
By *Lyons Hackley* atty

UNITED STATES PATENT OFFICE.

FREDERICK WEBSTER MATTHEWS, OF LOS ANGELES, CALIFORNIA.

TALKING-MOVING-PICTURE APPARATUS.

1,210,665.

Specification of Letters Patent.

Patented Jan. 2, 1917.

Application filed August 20, 1914. Serial No. 857,651.

To all whom it may concern:

Be it known that I, FREDERICK W. MATTHEWS, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Talking-Moving-Picture Apparatus.

Heretofore in the production of talking moving pictures it has been attempted to create the illusion of the talk coming direct from the picture and various expedients have been resorted to in the attempt to do this. One method has been to place the talking machine and projector behind the picture screen, but in this instance this was objectionable on account of the loss of light and sound which took place when the screen was between the audience and the projector apparatus and sound reproducing device.

Another method has been to place the talking machine at the side of the screen and the projector in front of the screen at a proper distance but perfect synchronism could not be obtained as the projector and talking machine could not be reliably connected through a distance. The talking machine and projector could be mechanically coupled together on one base and located at the rear of the auditorium and directed toward the screen but while in this instance synchronism is produced the illusion of the sound coming from the picture is entirely lost.

The mechanical synchronism has been accomplished by means of belting the machines or by shafts extending through the auditorium but on account of the distance between the machines this has proven unreliable and expensive to install necessitating two operators, one at each machine and causing difficulty in communication between them where instant understanding is necessary. Synchronism by means of electric motors has proven unreliable and in most cases requires two operators.

In the present invention I couple the talking machine and projector directly together, for example mechanically with a simple shaft locating both instruments upon a single base and I place this unit at the screen preferably close to one side thereof. As thus arranged the projector will throw the rays forward over the heads of the audience and I provide a reflector at a suitable point in the auditorium to reflect these rays back and throw them against the screen.

In this manner there is perfect synchronism between the talking machine and projector as it is not difficult to mechanically couple them together on the same base by means of gears and it is impossible for one to operate at a different speed from the other. The talking machine is located so close to the screen that it gives the illusion of the voice or other sound coming from the screen. It is the employment in the combination of the reflector which turns the rays back against the screen which enables me to locate the projector in front of the audience and to couple it direct to the talking machine in a simple and reliable manner and at such a point adjacent to the screen as to give the effect of the sound coming from the screen.

In the drawings the figure is a plan view of the invention.

The dotted line 1 designates the portion of the auditorium in which the people are seated.

2 designates the screen upon which the moving picture is thrown and which is located at the front-end of the auditorium and faces the audience.

3 designates a base upon which is mounted a talking machine 4 and a picture projector 5, these two machines being set at an angle relative to the extended plane of the screen and being connected together directly by a shaft 6 so that they operate in perfect synchronism.

7 designates a reflector which may be located rearward of the screen at an intermediate point in the auditorium above the audience, or it may be located at the back part of the auditorium. This reflector is parallel to the screen and out of axial alinement with the screen and receives the rays from the projector and throws them back as rays against the screen 2. The picture projector 5 is set at an angle relative to the extended plane of the screen, and out of axial alinement with the reflector. With this arrangement the talking machine is located immediately adjacent one edge of the screen 2 so that the most perfect illusion is obtained and perfect synchronism is obtained by reason of the mechanical connection between the talking machine and the projector.

What I claim is:

Talking moving picture apparatus comprising a projecting machine and a talking

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machine located adjacent to one another, means positively connecting the two for synchronous operation, a viewing screen adjacent to the two machines and a reflector
5 remote from the machines for receiving the image and reflecting it to the screen.

In testimony whereof, I have hereunto set

my hand at Los Angeles, California, this 14th day of August 1914.

FREDERICK WEBSTER MATTHEWS.

In presence of—

M. J. BUTLER,

LORRAINE E. DURROW.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

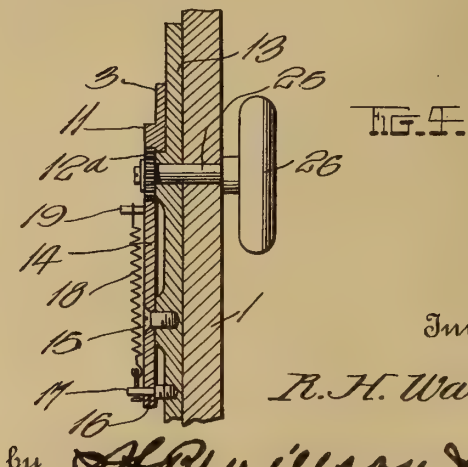
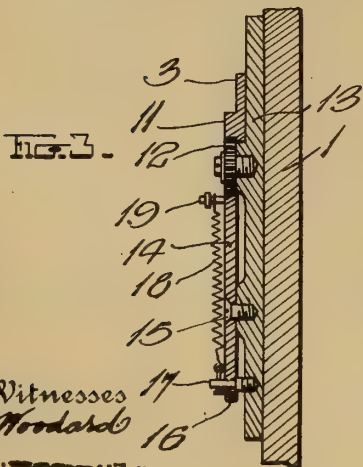
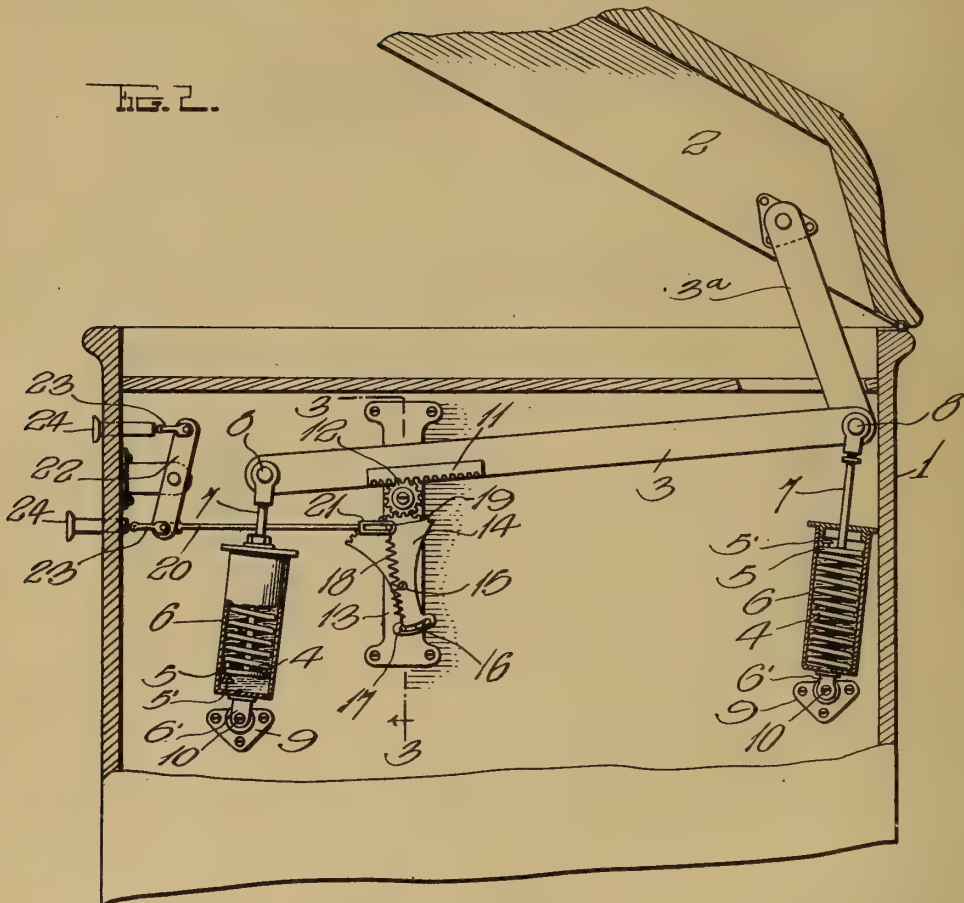
CONTROL FOR CABINET COVERS,
#1,210,875-----R. H. Ward,
Patented-January 2nd, 1917.
Filed-March 11th, 1916.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

R. H. WARD.
CONTROL FOR CABINET COVERS.
APPLICATION FILED MAR. 11, 1916.

1,210,875.

Patented Jan. 2, 1917.
2 SHEETS—SHEET 2.



Inventor

R. H. Ward

by *A. B. Wilson & Co*

Attorneys

UNITED STATES PATENT OFFICE.

RICHARD H. WARD, OF QUEENS, NEW YORK.

CONTROL FOR CABINET-COVERS.

1,210,875.

Specification of Letters Patent.

Patented Jan. 2, 1917.

Application filed March 11, 1916. Serial No. 83,580.

To all whom it may concern:

Be it known that I, RICHARD H. WARD, a citizen of the United States, residing at Queens, in the county of Queens and State of New York, have invented certain new and useful Improvements in Controls for Cabinet-Covers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in mechanisms for controlling the covers of cabinets such as those used for the housing of graphophones and other musical instruments.

The object of the invention is to provide a simple and comparatively inexpensive mechanism of the class set forth which will effectively open and close the cover by proper actuation of a pair of finger pieces such as push buttons, provision being made whereby the cover controlling mechanism is caused to act gradually and may not therefore exert sudden stress on the cover or on the cabinet.

With the foregoing general object in view, the invention resides in certain unique combinations of parts and in novel features of construction to be hereinafter fully described and claimed, the descriptive matter being supplemented by the accompanying drawings which constitute a part of this application and in which:

Figure 1 is a side elevation, partly in section of a cabinet showing the application of the invention thereto, the cover raising means being in position to raise the cover; Fig. 2 is a similar view showing the relation of parts when allowing said cover to lower; Fig. 3 is a detail vertical section taken on the plane indicated by the line 3-3 of Fig. 2; and Fig. 4 is a similar view of a slightly modified form of construction.

In specifically describing the construction shown in the drawings above briefly described, similar characters will be placed on corresponding parts throughout the several views and reference will be herein made to the numerous elements by their respective indices. To this end, the numeral 1 designates a cabinet having a hinged cover 2 to be controlled by the improved mechanism which constitutes the gist of the present invention.

Briefly speaking, the mechanism in ques-

tion comprises a lever 3 connected with the cover at one end, springs 4 for operating said lever to raise the cover, the power of said springs and lever being normally overcome by the weight of said cover, and means for adjusting the lever and its fulcrum relatively to increase the raising power of said lever, together with manual controls for this adjusting means. In the present embodiment of the invention the lever 3 is positioned horizontally and is connected at one end by a link 3^a with the cover 2 adjacent the hinged edge of the latter, and the springs 4 coöperate with plungers 5 mounted in dash pots 6, said plungers being carried by rods 7 pivoted at 8 to the opposite ends of the lever 3. The arrangement of the springs and plungers is such that they both exert their tension to move the lever 3 in a direction to raise the cover 2, said springs however, normally remaining idle and coming into use only when certain manual controls to be described are operated. When this is done the plungers 5 may move but slowly through the fluid in the dash pots, this movement being caused by vents 5' in said plungers. The size of these vents may be varied as occasion may demand, and by the use of any preferred means, the tension of the springs 4 may be varied.

The dash pots 6 may be mounted in any suitable manner, but they are preferably provided with depending ears 6' which are connected to fixed brackets 9 as shown, it being essential in the present embodiment of the invention that the connections between said ears and brackets be pivotal as indicated at 10.

Between its ends, the lever 3 carries a rack bar 11 whose teeth are positioned downwardly and meshed with those of a pinion 12 which is mounted rotatably on an upright bracket plate 13 or an equivalent device. Teeth on the upper end of a sector 14 mesh with the pinion as clearly shown in Figs. 1 and 2, this sector being pivoted at 15 to the bracket 13 and having in its lower end an arcuate slot 16 lying concentric with the pivot, said slot receiving therein a fixed stop pin or the like 17 projecting laterally from the aforesaid bracket whereby to limit the movement of the sector 14 in opposite directions around its pivot.

A double acting coiled spring 18 is secured at its lower end to the stop 17 and at

its upper end to a stud 19 projecting laterally from the sector 14 midway between the side edges of the latter. This spring serves to quickly move the sector in either direction beyond a neutral position, after said sector has been disposed in such position by the manual controls yet to be described. The result of this is that when the pinion 12 is rotated by actuation of the sector 14 in one direction or the other, the fulcrum point of the lever 3 will be varied to increase or decrease the lifting power of said lever according to the direction in which the sector be moved. If it be shifted in one direction, the springs 4 may then rock the lever 3 in such a direction as to force upwardly on the link 3^a and raise the cover 2, this taking place slowly and smoothly due to the action of the plungers 5 within the dash pots 6. If said sector be moved in the other direction, however, the lifting power of the lever 3 is decreased to such an extent as to allow the weight of the cover to overcome this power, whereupon said cover will lower. Obviously, this lowering operation will also take place slowly and smoothly on account of the action of the plungers and dash pots as above set forth.

Any preferred means may be provided for moving the sector 14 from either of its extreme positions to a neutral position from which it will be suddenly shifted by the spring 18. In Figs. 1 to 3, an operating rod 20 is shown, said rod having at one end an elongated loop 21 in which the pin 19 is slidably received, the other end of said rod being pivoted to a lever 22 fulcrumed between its ends. Connected to the ends of this lever by links 23 are two push buttons 24 which project an appropriate distance beyond the front of the cabinet 1. If the proper button 24 is moved to position the sector 14 as shown in Fig. 1, said sector will so dispose the pinion 12 as to increase the raising power of the lever 3 as shown in this figure, whereupon the cover 2 will be opened and held in open position. If, however, it is desired to close the cover, the parts are disposed as seen in Fig. 2 by actuation of the proper button, thereby decreasing the raising power of the lever 3 with the result that the cover will lower by gravity. This lowering will obviously be slow and gradual due to the provision of the dash pot 6 and thus no shocks will be imparted to the cabinet or to the instrument housed therein.

In Fig. 4, a pinion 12^a is shown serving as a fulcrum for the operating lever, said pinion being carried by a spindle 25 having an operating knob 26 disposed on the exterior of the cabinet 1. When this arrangement is used, the push buttons 24 and the connections between the same and the sector 14 will be omitted and in fact said sector may well be dispensed with, in which case

the lever and its fulcrum will be adjusted entirely by hand through the instrumentality of the knob 26.

From the foregoing, considered in connection with the accompanying drawings, the construction and manner of operation of the improved mechanism will be readily understood, and it will be evident that it will not only be comparatively inexpensive, but will be highly efficient and will possess a number of advantageous characteristics.

In conclusion, I will state that although certain specific details have been shown and described for illustrative purposes, numerous changes may be made within the scope of the invention as claimed without sacrificing the main advantages thereof.

I claim:

1. The combination with a cabinet and a cover therefor, of a lever connected with the cover for raising the same, mechanical means connected with said lever for operating the same, the relation between the fulcrum of the lever and the points of connection of said operating means and cover with said lever being normally such as to prevent said means from moving said lever, and means for varying said relation to permit the operating means to shift the lever for the purpose of elevating the cover.

2. The combination with a cabinet and a cover therefor, of a lever connected with the cover for raising the same, means for operating said lever, the power of the latter being normally overcome by the weight of the cover, and means for adjusting the lever and its fulcrum relatively to increase the raising power of said lever.

3. The combination with a cabinet and a cover therefor, of a lever connected with said cover for raising the same, said lever having as its fulcrum a roller, means for operating said lever, the power of the latter being normally overcome by the weight of the cover, and means for rotating the aforesaid roller to adjust it and the lever relatively to increase the raising power of the latter.

4. The combination with a cabinet and a cover therefor, of a lever connected with said cover for raising the same, means for operating said lever, the power of the latter being normally overcome by the weight of said cover, means for adjusting the lever and its fulcrum relatively to increase the raising power of said lever, manually operated means for initially moving said adjusting means, and mechanical means for quickly completing the movement of said adjusting means.

5. The combination with a cabinet and a cover therefor, of a lever connected with said cover for raising the same, means for operating said lever, the power of the latter being normally overcome by the weight of

said cover, a pivotally mounted adjuster for adjusting said lever and its fulcrum relatively to vary the raising power of said lever, said adjuster being movable in opposite directions around its pivot to respectively increase and decrease the power of the lever, and means for actuating said adjuster.

6. The combination with a cabinet and a cover therefor, of a lever connected with said cover for raising the same, means for operating said lever, the power of the latter being normally overcome by the weight of said cover, a pivotally mounted adjuster for adjusting said lever and its fulcrum relatively to vary the raising power of said lever, said adjuster being movable in opposite directions around its pivot to respectively increase and decrease the power of the lever, manual means for initially moving said adjuster in either direction, and mechanical means for then quickly completing the movement of said adjuster.

7. The combination with a cabinet and a cover therefor, of a lever connected with said cover for raising the same, means for operating said lever, the power of the latter being normally overcome by the weight of said cover, a pivotally mounted adjuster for adjusting said lever and its fulcrum relatively to vary the raising power of said lever, said adjuster being movable in opposite directions around its pivot to respectively increase and decrease the power of the lever, manual means for initially moving said adjuster in either direction, and a double acting spring for then quickly completing the movement of said adjuster.

8. The combination with a cabinet and a cover therefor, of a lever connected with said cover for raising the same, means for operating said lever, the power of the latter being normally overcome by the weight of said cover, a pivotally mounted adjuster for adjusting said lever and its fulcrum relatively to vary the raising power of said lever, said adjuster being movable in opposite directions around its pivot to respectively increase and decrease the power of the lever and having an arcuate slot concentric with its axis, a fixed stop extending into said slot, and means for moving said adjuster in either direction at will.

9. The combination with a cabinet and a cover therefor, of a lever connected with said cover for raising the same, means for operating said lever, the power of the latter being normally overcome by the weight of said cover, a pivotally mounted adjuster for adjusting said lever and its fulcrum relatively to vary the raising power of said lever, said adjuster being movable in opposite directions around its pivot to respectively increase and decrease the power of the lever and having an arcuate slot con-

centric with its axis, a fixed stop extending into said slot, a double acting spring secured at its ends to said stop and adjuster for moving the latter in either direction beyond a neutral position, and manually operated means for moving said adjuster to said neutral position.

10. The combination with a cabinet and a cover therefor, a lever connected with said cover for raising the same, a rod extending from said lever and carrying a plunger, a dash pot in which said plunger is mounted, a spring for moving the lever and plunger, the power of said lever and spring being normally overcome by the weight of the cover, and means for adjusting the lever and its fulcrum relatively to increase the raising power of said lever.

11. The combination with a cabinet and a cover therefor, of a substantially horizontal lever connected with said cover for raising the same, means for operating said lever, the power of the latter being normally overcome by the weight of the cover, a rack carried by said lever between its ends, a rotatably mounted pinion meshing with said rack and serving as the fulcrum of the lever, a laterally swinging sector meshing with said pinion, and means for shifting said sector whereby to vary the fulcrum point of the lever to increase the raising power of the latter.

12. The combination with a cabinet and a cover therefor, of a substantially horizontal lever connected with said cover for raising the same, means for operating said lever, the power of the latter being normally overcome by the weight of the cover, a rack carried by said lever between its ends, a rotatably mounted pinion meshing with said rack and serving as the fulcrum of the lever, a sector meshing with said pinion and movable laterally in opposite directions, double acting spring means for quickly shifting said sector in either direction from a neutral position, a stud projecting laterally from said sector, a horizontal operating rod having an elongated loop on one end slidably receiving said stud, a lever fulcrumed between its ends and pivoted at one end to the other end of said rod, and a pair of push buttons pivoted to the opposite ends of the last named lever, whereby operation of said buttons may move the aforesaid sector to its neutral position, whereupon the double acting spring will continue the movement of said sector to vary the fulcrum point of the first named lever.

13. The combination with a cabinet and a cover therefor, of a substantially horizontal lever connected with said cover and having between its ends a rack bar, a rotatably mounted pinion meshing with said rack bar and serving as the fulcrum of the

lever, means for operating said lever to
raise the cover, the power of said lever and
operating means being normally overcome
by the weight of said cover, and means for
5 rotating such pinion to vary the fulcrum
point of the lever thus increasing the rais-
ing power thereof.

In testimony whereof I have hereunto set
my hand in presence of two subscribing
witnesses.

RICHARD H. WARD.

Witnesses:

RALPH H. ALLEN,
JOHN J. COLLIGAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

SPEED CONTROLLER FOR GRAPHOPHONES,
#1,211,066-----J. H. Bragdon,
Patented-January 2nd, 1917.
Filed-January 14th, 1915.

J. H. BRAGDON.
SPEED CONTROLLER FOR GRAPHOPHONES.
APPLICATION FILED JAN. 14, 1915.

1,211,066.

Patented Jan. 2, 1917.
2 SHEETS—SHEET 1.

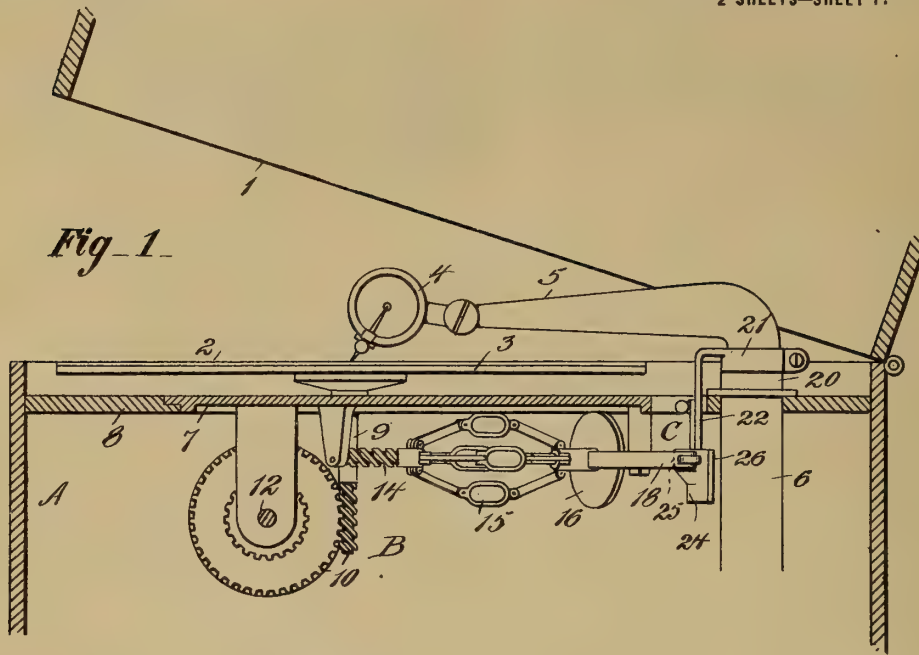
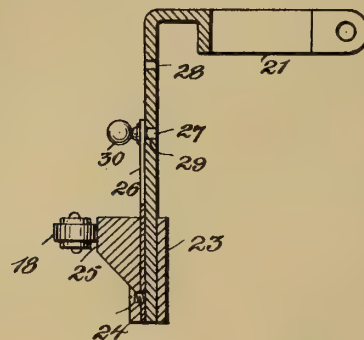
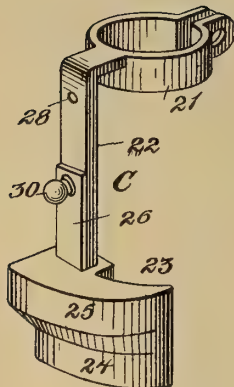


Fig. 3

Fig. 4



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APPLICATION FILED JAN. 14, 1915.

1,211,066.

Patented Jan. 2, 1917.
2 SHEETS—SHEET 2.

Fig 2

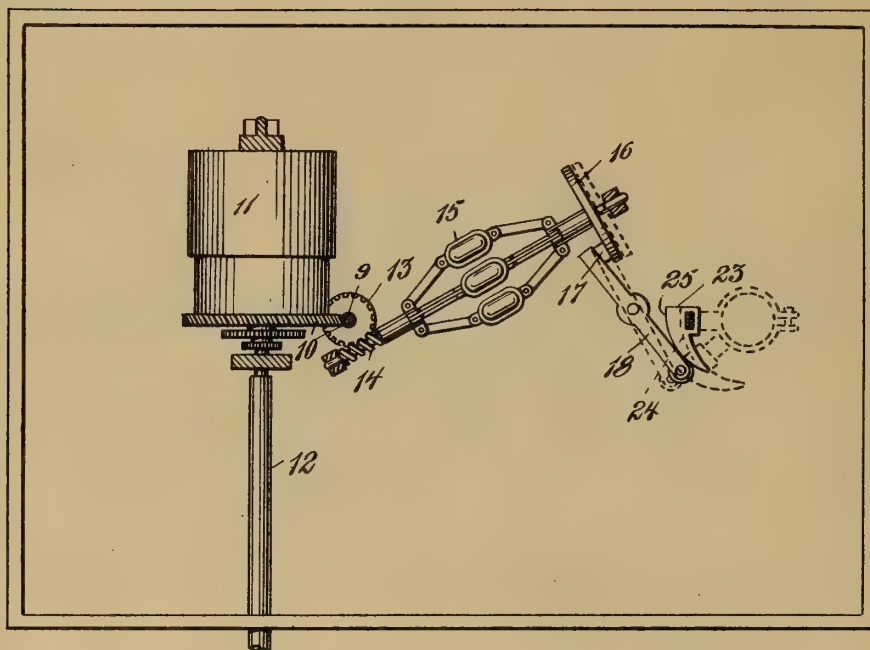


Fig 5

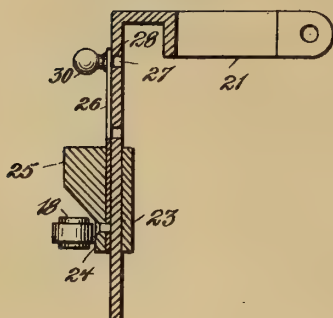


Fig 6

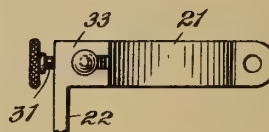
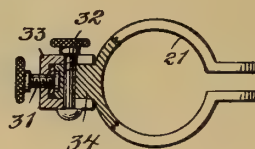


Fig 7



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SPEED-CONTROLLER FOR GRAPHOPHONES.

1,211,066.

Specification of Letters Patent.

Patented Jan. 2, 1917.

Refilling of application Serial No. 758,380, filed April 2, 1913. This application filed January 14, 1915. Serial No. 2,157.

To all whom it may concern:

Be it known that I, JOSEPH H. BRAGDON, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Speed-Controller for Graphophones, of which the following is a full, clear, and exact description.

10 In graphophones now in common use the record disk is driven at a uniform rotative speed, the approved speed being 78 R. P. M. In view of this uniform speed of rotation the surface speed of the record track or spiral groove of the disk is maximum near the circumference and minimum at the center. Because of this uniformly changing surface speed the record area of the disk cannot receive as much recorded matter as would be possible with a disk driven at a uniform surface speed and a constantly varying rotative speed. The desirability of driving the disk in making a record at a uniform surface speed has been recognized, and a graphophone based upon this principle is the subject matter of United States Letters Patent No. 730,986, granted to C. S. Tainter, June 16, 1903.

20 The patented graphophone apparently has not been commercially introduced because of the fact that the manufacturers of records would be compelled to produce two types of records, one for the old machines, where the disk rotative speed is constant, and another set for the type of machine where the surface speed is constant; or two kinds of machines must be provided. Because of this problem it is advantageous to provide a graphophone which is convertible for use with both kinds of records, and it is the object of the present invention to provide a graphophone which can be readily adjusted to obtain a uniform rotative speed for the record or a uniform surface speed thereof.

30 In carrying out the invention a device operatively connected with the recorder or reproducer-carrying arm is employed to operate on the brake shoe lever of the speed regulator, and by the adjustment of this device to one position the brake shoe will engage the brake disk of the speed regulator with a uniform friction when a uniform rotative speed of the disk is desired, and when adjusted to another position the device will

cause the brake shoe to grip the brake disk with varying friction, which uniformly changes so that the record disk will rotate at a uniformly varying speed, but at a constant surface speed. This device is so arranged that it can be easily and quickly adjusted by a person of average intelligence, so that two different types of records can be used, one after the other, with very little inconvenience to the operator. Furthermore, the device that controls the friction of the brake shoe can be adjusted for regulating the speed when that becomes necessary, due to wear of the brake shoe, or any other cause.

With these objects in view, and others as will appear as the description proceeds, the invention comprises various novel features of construction and arrangement of parts which will be more fully described hereinafter and set forth with particularity in the claims appended hereto.

In the accompanying drawings, which illustrate one embodiment of the invention, and wherein similar reference characters are employed to designate corresponding parts throughout the several views; Figure 1 is a sectional view through the upper portion of a graphophone of the cabinet type, wherein the amplifier is embodied in the cabinet; Fig. 2 is a horizontal sectional view through the machine to show the disk-driving mechanism speed regulator and controlling device for the latter; Fig. 3 is a perspective view of the controlling device removed; Figs. 4 and 5 are sectional views of the controlling device, showing the cam thereof in different operative positions with respect to the brake lever; Fig. 6 is a side view showing the means for setting the device to obtain any desired initial speed of rotation; and Fig. 7 is a plan view, partly in section, of Fig. 6.

In the present instance an ordinary cabinet graphophone is shown, but it is to be understood that the invention is not necessarily limited to this type of machine.

A designates the body or cabinet of the machine equipped with the usual lid 1 that incloses the record disk 2, driving table 3, reproducer 4 and arm 5 that carries the reproducer. The reproducer arm is connected by a tube or neck 6 with the usual amplifier, not shown. The driving mechanism B for the turn table 3 is mounted on the under side of a plate 7 removably set into the hori-

zontal partition 8. As this mechanism B is of the usual form a brief description will suffice. The vertical shaft or spindle 9 is driven through worm gearing 10 by the spring motor 11, which is adapted to be wound by a shaft 12. As shown in Fig. 2, the turn table shaft 9 has a worm gear 13 that meshes with a worm 14 that causes the weights or centrifugal elements 15 of the speed regulator or governor to be rotated, and operatively connected with these weights is the brake disk 16. Coöperating with this brake disk is a shoe 17 carried by a lever 18, which latter is ordinarily capable of adjustment by hand to regulate the speed at which the graphophone record rotates.

The hand adjustment means operating on the lever 18 is dispensed with and in lieu thereof the attachment C is employed, whereby the lever 18 can be subjected to a uniform pressure to obtain uniform rotative speed of the turn table 3, or subjected to a variable pressure to obtain variable rotative speed of the turn table. This attachment C, while capable of various embodiments, is shown in the present instance as consisting of a band 21 which encircles the vertical portion 20 of the reproducer carrying arm, the vertical portion forming the axis on which the arm swings, and on the band 21 is a depending arm 22 that extends into the chamber that contains the operating mechanism for the turn table, there being on this arm an adjustable controlling device 23 which engages the brake shoe carrying lever 18. This device 23 has two surfaces 24 and 25, the first of which is concentric with the axis of rotation of the reproducer carrying arm, and the second is eccentric thereto, and by moving the device 23 vertically on the arm 22, either the concentric or eccentric surface can be engaged with the brake shoe lever. To hold the device 23 in adjusted position a spring 26 is connected with the device and equipped with a pin 27 adapted to engage in upper or lower openings 28 and 29 in the arm 22, and for conveniently releasing the pin from one opening and engaging it in the other a knob 30 is connected with the spring 26, so that by pulling outwardly on the spring the pin can be disengaged, and while the spring is held outwardly the device be shifted up or down to engage the pin with the other opening. When the brake shoe lever 18 is in the position shown in Fig. 4, that is, engaged with the eccentric surface 25, the pressure on said lever will be uniformly decreased as the reproducer carrying arm 5 moves from the periphery toward the center of the record disk, and as a result the speed of rotation of the record disk will be uniformly increased to obtain a constant surface speed. When the brake shoe lever is in the position shown in Fig. 5, the friction be-

tween the brake shoe and disk will be constant during the travel of the reproducer carrying arm, and hence the rotative speed of the record disk will be uniform. In other words, when the device 23 is adjusted to the position shown in Fig. 4, the machine is adapted to operate on record disks which are produced at a uniform surface speed, while, when the device 23 is adjusted to the position shown in Fig. 5, the machine is set to operate with records intended for a uniform rotative speed.

To provide for setting the device 23 to obtain the desired initial speed, some means must be provided to adjust the device 23 toward or from the brake shoe lever 18 to vary the pressure of the brake shoe 17 on the brake disk 16. One way of accomplishing this result is to make the arm 22 separate from the supporting band or ring 21, and move the arm 22 back or forth on the ring by a set screw 31 or equivalent means. When the proper adjustment is obtained a clamping device, such as a bolt, 32 passing through the parts 33 and 34 of the arm 22 and ring 21 is tightened. This adjustment, however, is comparatively infrequent, as it is intended primarily to compensate for wear of the parts, or for obtaining change in the initial speed at which the record disk is to be driven.

From the foregoing description taken in connection with the accompanying drawings, the advantages of the method of operation and of the apparatus shown will be readily understood by those skilled in the art to which the invention appertains, and while I have described the apparatus which I now consider to be the best embodiment thereof, I desire to have it understood that the apparatus shown is merely illustrative, and that such changes may be made when desired as are within the scope of the appended claims.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. In a graphophone, the combination of a casing, a graphophone record disk support mounted outside the casing, a driving mechanism within the casing and operatively connected with the support for rotating the same, said mechanism including a speed governor, a sound box carrier in the form of a hollow tone arm having a vertical portion serving as the axis on which the arm swings, said arm being movable by the grooves in the record and mounted exteriorly to the casing and in coöperative relation with the said support, and a device carried by and movable with the vertical portion of the tone arm and extending into the casing to control the governor for obtaining a uniform rotative speed of the record disk sup-

port, or a progressively varying rotative speed thereof.

2. In a graphophone, the combination of a reproducer, a tone arm supporting the
5 reproducer, a record disk driving mechanism including a speed governor, and a device mounted on the reproducer tone arm and adjustable to different positions to control the speed governor for obtaining a uni-
10 form rotative speed or a progressively varying rotative speed of the record disk.

3. The combination of a carrier for a sound box, a record disk driving mechanism, a speed governor including a brake
15 disk, a controller therefor consisting of a brake shoe element engaging the said disk, and separate surfaces movable with the said carrier to operate on the brake shoe element to obtain a uniform rotative speed
20 or a progressively varying rotative speed of the record disk.

4. The combination of a swinging reproducer-carrying arm, mechanism for driving
25 a record disk, a governor therefor including a brake shoe element, a device having

separate surfaces respectively concentric and eccentric to the axis on which the reproducer carrying arm swings, and means for adjusting the device to engage either surface with the brake shoe element. 30

5. The combination of a swinging reproducer-carrying arm, mechanism for driving a record disk, a governor therefor including a brake shoe element, a device having
35 separate surfaces respectively concentric and eccentric to the axis on which the reproducer carrying arm swings, means for adjusting the device to engage either surface with the brake shoe element, and means
40 for setting said device with respect to the brake shoe element to obtain any desired initial speed of the record driving mechanism.

In testimony whereof I have signed my name to this specification in the presence
45 of two subscribing witnesses.

JOSEPH H. BRAGDON.

Witnesses:

C. BRADWAY,

G. H. EMSLIE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents
Washington, D. C."



Graph-Ref.

STOP MECHANISM FOR TALKING MACHINES,
#1,211,110-----R. Duncan,
Patented-January 2nd, 1917.
Filed-February 3rd, 1916.

R. DUNCAN.
STOP MECHANISM FOR TALKING MACHINES.
APPLICATION FILED FEB. 3, 1916.

1,211,110.

Patented Jan. 2, 1917.

Fig. 1.

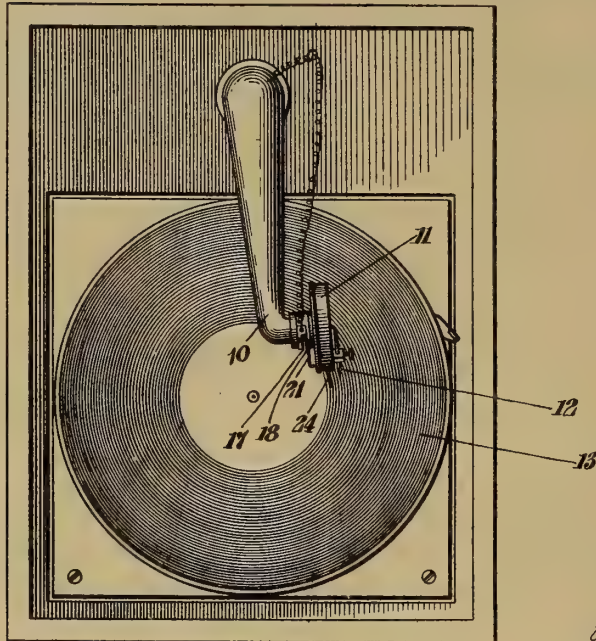


Fig. 2.

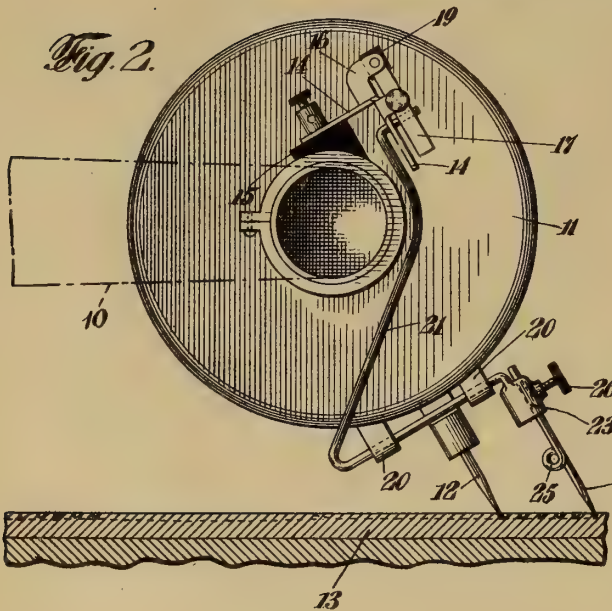
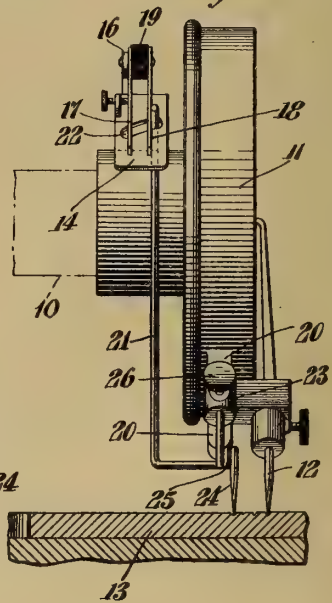


Fig. 3.



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Edwin H. Dietrich.

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Conrad A. Dietrich
his ATTORNEY

UNITED STATES PATENT OFFICE.

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STOP MECHANISM FOR TALKING-MACHINES.

1,211,110.

Specification of Letters Patent.

Patented Jan. 2, 1917.

Application filed February 3, 1916. Serial No. 75,895.

To all whom it may concern:

Be it known that I, RAYMOND DUNCAN, a citizen of the United States, residing at the city of New York, borough of Manhattan, in the county and State of New York, have invented certain new and useful Improvements in Stop Mechanisms for Talking-Machines, of which the following is a full, clear, and exact specification.

My invention relates to improvements in means for controlling the operation of talking machines, and more particularly to means for governing the circuit of an electrically controlled mechanism for controlling the operation of the talking machine in any manner.

One of the objects of the invention is to provide circuit controlling means adapted to be actuated by a record when the same has been completely played whereby to govern the operation of the electrically controlled mechanism.

Another object is to provide a normally open circuit-closer adapted to be closed by a record when the same has been played whereby the electrically controlled mechanism will be operated.

Another object is to provide circuit controlling means comprising co-acting contact members one of which is adapted to be moved relatively to the other by the groove of a record when the same has been played.

Another object is to provide circuit controlling means comprising co-acting contact members and a member actuated by the record to move one of the contact members relatively to another thereof when a record has been played.

Other objects will in part be obvious and in part be pointed out hereinafter.

To the attainment of the aforesaid objects and ends, my invention consists in the novel details of construction, and in the combination, connection and arrangement of parts hereinafter more fully described and then pointed out in the claims.

In the accompanying drawings showing an illustrative embodiment of the invention—Figure 1 is a plan view of a talking machine showing my improved controlling device attached thereto; Fig. 2 is a side elevation of a reproducer having the controlling means affixed thereto, and Fig. 3 is a front elevation of the same.

For purposes of illustration my said invention is shown as applied to a well-known

type of talking machine but it is to be understood that it may be applied to other types of machines without departing from the spirit of the invention. It is also to be understood that while the invention is described in connection with an electrically controlled brake mechanism it is adapted to be used in connection with electrically controlled mechanism for controlling a mechanism for any desired purpose.

Referring to the drawings 10 represents a swinging tone arm carrying a reproducer 11 of any suitable construction and including a stylus 12 which engages the tone groove of a record 13 in the usual manner whereby, as the record is being played, the tone arm 10 will swing about its support to permit the stylus 12 to follow the convolutions of the groove.

A bracket 14 mounted upon an insulating block 15, preferably carried by the reproducer 11, is provided with a lug 16 having a contact member 17 secured thereto and electrically connected therewith. The lug 16 also supports a removable or resilient contact member 18 which is normally out of engagement with the contact member 17 and is insulated therefrom by a block 19 of suitable insulating material. Pivotally mounted in lugs 20, 20, upon the reproducer 11, is an arm 21 having one of its ends extending through a guiding slot 22 in the bracket 15 and engaging the resilient contact member 18 whereby the arm 21 will normally be held in its inoperative position. At its other end the arm 21 is provided with a socket 23 to receive a groove engaging member 24 formed of resilient or yielding material such as wire or the like and preferably provided with a coiled portion 25 intermediate its ends to render it more resilient in order that it will not injure the record. The member 24 is removably held within the socket 23 by means of a set screw 26 so that it may be readily adjusted or removed when worn and replaced by a new member. When the arm 21 is in its normal position, in which it is held by means of the resilient contact member 18, the groove engaging member 24 will be spaced from the stylus 12 of the reproducer 11 so that when the reproducer is in its record playing position the member 24 will engage the groove in advance of the stylus.

An electric circuit, including a source of

electrical energy and a suitable electro-magnetically operated brake (not shown) for controlling the rotation of the record support, has one of its ends connected to the bracket 14 and its other end electrically connected to the tone arm 10. Under normal conditions this circuit will be open by reason of the normally spaced contact members 17 and 18 of the circuit-closer which is constituted by these contact members. When, however, the arm 21 is moved to cause the contact member 18 to engage the contact member 17, as hereinafter described, the circuit will be closed and the brake will be operated to engage the record support and arrest the movement thereof in the well-known manner.

The operation is as follows:—When it is desired to play a record the brake is released, thereby permitting the record support to revolve, and the reproducer 11 is then positioned to cause the stylus 12 to engage the groove at the beginning of the record with the groove engaging member 24 engaging a groove in advance of the one engaged by the stylus 12. As the stylus and the groove engaging member follow the convolutions of the groove they will not move relatively to one another and the arm 21 will be maintained in its normally inoperative position, the electric circuit being broken by the normally spaced contact members 17 and 18. When, however, the groove engaging member arrives at the end of the groove further movement thereof relatively to the record is prevented, but as the stylus continues to follow the groove the reproducer will be caused to continue to move relatively to the record. As the groove engaging member 24, which is attached to one end of the arm 21, is held against movement, such continued movement of the reproducer will cause the arm 21 to rotate within the lugs 20, 20. As a result of this movement of the arm the other end thereof will be moved to cause the movable or resilient contact member 18 to approach and finally to engage the contact member 17 thereby closing the electric circuit and causing the brake to be operated to engage the record support and prevent its further rotation.

When the reproducer is raised from the record the movable or resilient contact member 18 will return to its normal position out of engagement with the contact member 17 and thus break the electric circuit and at the same time cause the arm 21 to return to its normal position.

Having thus described my said invention what I claim and desire to secure by Letters Patent is:—

1. In combination, a reproducer including a stylus, circuit controlling means carried by said reproducer and comprising co-acting contact members one of which is

movable into and out of engagement with the other thereof, and means adapted to engage the tone groove of a record and to be actuated thereby to move said movable contact member relatively to said other contact member, substantially as specified. 70

2. In combination, a reproducer including a stylus, circuit controlling means carried by said reproducer comprising a fixed member and a member movable into and out of engagement therewith, and means adapted to engage the tone groove of a record and to be actuated thereby for moving said movable member relatively to said fixed member, substantially as specified. 75

3. In combination, a reproducer including a stylus, a normally open circuit closer carried by said reproducer, and means adapted to engage the tone groove of a record and to be actuated thereby for closing said normally open circuit closer, substantially as specified. 80

4. The combination of a tone arm carrying a reproducer including a stylus, with co-acting contact members, and means adapted to be controlled by the tone groove of a record for moving one of said contact members relatively to another thereof, substantially as specified. 85

5. The combination of a tone arm carrying a reproducer including a stylus, with normally spaced co-acting contact members, and means adapted to be controlled by the tone groove of a record for closing said normally spaced contact members, substantially as specified. 90

6. The combination of a tone arm carrying a reproducer including a stylus, with co-acting contact members, a movable arm operatively associated with one of said co-acting contact members, and means controlled by the tone groove of a record for actuating said arm to move said one of the co-acting contact members relatively to another thereof, substantially as specified. 95

7. The combination of a tone arm carrying a reproducer including a stylus, with co-acting contact members, a pivotally mounted arm operatively associated with one of said co-acting contact members, and means controlled by the tone groove of a record for actuating said arm to move said one of the co-acting contact members relatively to another thereof, substantially as specified. 100

8. The combination of a tone arm and a reproducer thereon, with a contact member, a resilient contact member co-acting with said first contact member and normally out of engagement therewith, and record controlled means for moving said resilient contact member into engagement with said first-named contact member, substantially as specified. 105

9. The combination of a tone arm and a reproducer thereon, with a contact member, 110

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a resilient contact member co-acting with said first contact member and normally out of engagement therewith, a movable arm engaging said resilient contact member, and
5 record controlled means carried by said arm to actuate the same to move said resilient contact member into engagement with said first-named contact member, substantially as specified.

- 10 10. The combination of a tone arm and a reproducer thereon, with a contact member, a resilient contact member co-acting with said first contact member and normally out of engagement therewith, an arm pivotally
15 mounted upon the reproducer and engaging

said resilient contact member, and record controlled means carried by said arm to actuate the same to move said resilient contact member into engagement with said first-named contact member, substantially as 20 specified.

Signed at the city of New York, in the county and State of New York, this 29th day of December, one thousand nine hundred and fifteen.

RAYMOND DUNCAN.

Witnesses:

MARTIN CONROY,
JAMES B. LITTLE.

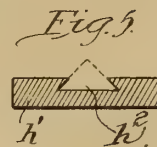
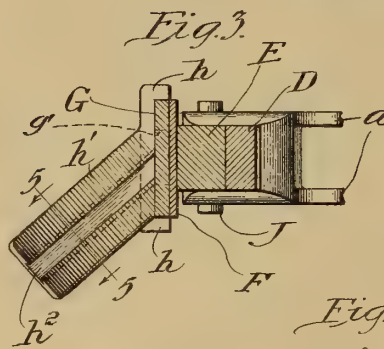
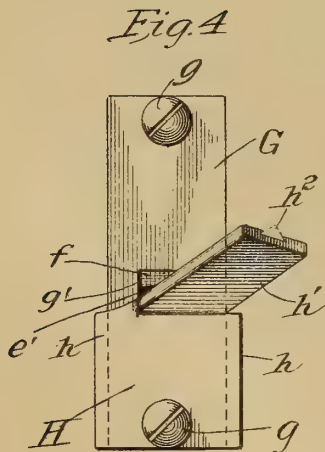
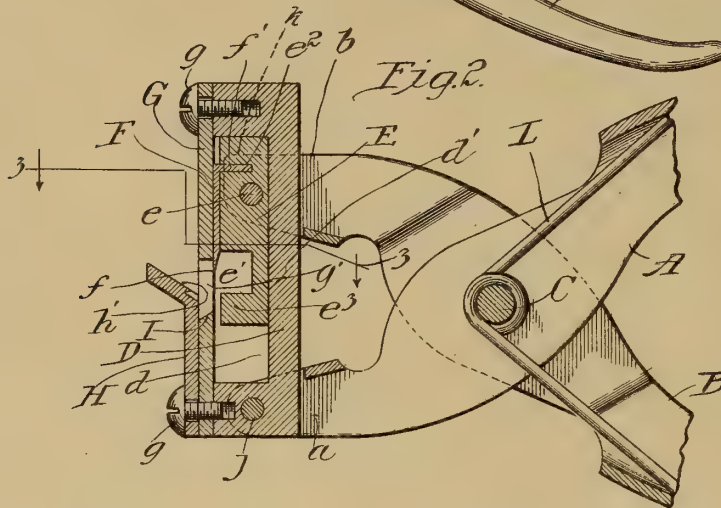
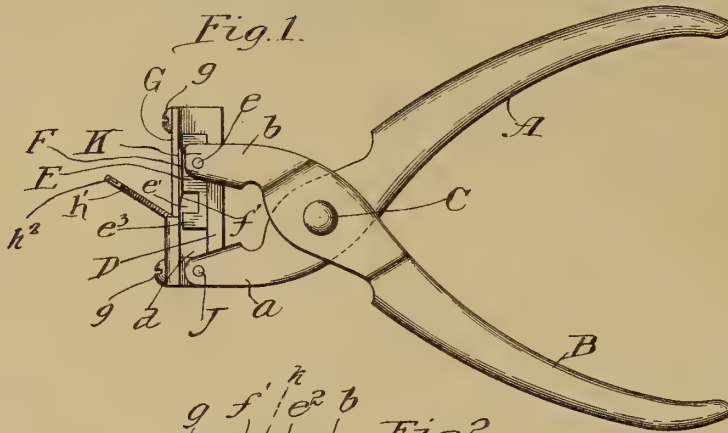
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PHONOGRAPH NEEDLE CUTTER,
#1,211,532-----B. B. Blood,
Patented-January 9th, 1917.
Filed-February 14th, 1914.

B. B. BLOOD.
 PHONOGRAPH NEEDLE CUTTER.
 APPLICATION FILED FEB. 14, 1914.

1,211,532.

Patented Jan. 9, 1917.



Witnesses
 Arthur W. Culson,
 Arthur B. Franke.

Inventor
 Burr B. Blood
 By Arthur F. Durand
 Attorney

UNITED STATES PATENT OFFICE.

BURR B. BLOOD, OF CHICAGO, ILLINOIS, ASSIGNOR TO CARLYLE MACHARG, OF CHICAGO, ILLINOIS.

PHONOGRAPH-NEEDLE CUTTER.

1,211,532.

Specification of Letters Patent.

Patented Jan. 9, 1917.

Application filed February 14, 1914. Serial No. 818,622.

To all whom it may concern:

Be it known that I, BURR B. BLOOD, a citizen of the United States of America, and resident of Chicago, Cook county, Illinois, have invented a certain new and useful Improvement in Phonograph-Needle Cutters of which the following is a specification.

My invention relates to cutters for sharpening fiber phonograph needles. Ordinarily, and if not re-sharpened, these needles, which are made of bamboo, are thrown away after being used once. Some attempt has been made to provide cutters for sharpening these needles. It is to cutters for this particular purpose that my invention relates.

The object of my invention, generally stated, is to provide a cutter of simple and durable construction, which will sharpen the needles more satisfactorily than heretofore, and which can be manufactured cheaply.

A special object is to provide an improved construction and arrangement whereby the knife can be easily removed and replaced, whereby the device can be operated easily and with certainty, and whereby the cutting of the bamboo or fiber will produce a sharp point of the requisite character.

It is also an object to provide certain details and features of construction tending to increase the general efficiency and serviceability of a phonograph needle cutter of this particular character.

To these and other useful ends my invention consists in matters hereinafter set forth and claimed.

In the accompanying drawings—Figure 1 is a side elevation of a phonograph needle cutter or sharpener embodying the principles of my invention. Fig. 2 is a sectional view of the cutting mechanism of said device, on a larger scale, showing the adjacent portions of the handle. Fig. 3 is a section on line 3—3 in Fig. 2. Fig. 4 is a front elevation of the mechanism shown in Fig. 2. Fig. 5 is an enlarged detail section on line 5—5 in Fig. 3.

As thus illustrated, my invention comprises a pair of handles A and B pivotally connected together at C, said handles being formed from sheet metal. The rectangular body D is pivotally connected at one end thereof with the ears *a* of the handle A, and is provided with a recess *d* in the face thereof. The sliding block E is mounted to reciprocate in the recess *d*, upon the surface *d*¹ of the body, and is pivotally connected at *e* with the ears *b* of the handle B, it being understood that said ears embrace the body. A knife F is mounted upon the face of the block E, with its edge *f* overhanging the recess *e*¹ in said block. The rear end portion *f*¹ of the knife is formed at right angles to the body of the knife and engages a slot *e*² in the said block, being readily removable therefrom. With this arrangement the said knife is held in place by a face plate G which is secured to the body D by screws *g*, said plate providing a smooth surface upon which the knife slides back and forth. It will be seen that said plate has an opening *g*¹, and that a gage plate H is secured upon the outer surface of the plate G, being provided with flanges *h* at each side thereof. These flanges engage the edges of the plate G, and the plate H is held in place by the lower screw *g*, whereby the structure is firmly held together. The plate H has an angular and outwardly extending portion *h*¹ provided on its inner side with a dovetailed groove *h*² for the insertion of the needle.

The method of use is as follows:—The needle is inserted endwise in the groove *h*² until it engages the stop or abutment *e*³ which latter is integral with the sliding block E and which limits the insertion of the needle to bring the end thereof into proper position relative to the knife. Then the handles are brought together, causing the knife edge *f* to cooperate with the stationary knife edge I in cutting off a small end portion of the needle. The hard or glossy side of the bamboo needle is preferably placed against the bottom of the groove *h*², and this brings the needle into such posi-

tion that the edge f enters the soft side of the needle and cuts through to the hard layer at the other side. This puts a good point on the needle, and leaves it perfectly sharp, instead of making it rough or ragged.

By reason of the two pivotal connections e and J , the knife reciprocates along a straight line, and the result is that the cutting is of the required character—that is to say, the end of the needle is cut off clean and sharp. It will also be seen that by moving one of the screws g , so that the plate G can be swung to one side, the knife F can be removed and sharpened, or replaced by a new one when worn out. The corner portions K of the ears b extend over the rear end portions f^1 of the knife, whereby the latter is held against lateral displacement. In this way the knife does not need to be fastened in the block E , but is simply inserted in the slot e^2 , the portions K and the plate G co-operating to hold the knife against displacement. The said knife can be made of springy steel, so that when the plate G is secured in place the knife will be placed under some tension, thus insuring a tight contact between its edge f and the smooth end surface of the plate G , in order to insure the proper coöperation between the two cutting edges. Gage h^1 , it will be seen, not only leans toward the plate G , but also to one side, (see Fig. 4), whereby the needle is given the well known and proper bevel at the end thereof, when the hard or glossy side of the needle is placed in the groove h^2 formed on the face of said gage.

It will be understood, of course, that the two handles A and B can be held yieldingly apart by a spring L or any other suitable means. When the handles are released, this spring moves or restores the parts to the relative positions shown in the drawings.

My invention contemplates broadly a phonograph needle cutter which can be held in one hand and operated while the needle is presented to the cutter by the other hand, and it also contemplates certain features of improvement in needle cutters broadly, as herein shown and described, and I do not limit myself to the exact construction shown and described.

What I claim as my invention is:—

1. A phonograph needle cutter comprising a body, a cutting edge, a block reciprocating on said body, a knife on said block, adapted to coöperate with said edge, means for holding the needle in position between said knife and edge, and means for causing said block to reciprocate relative to said body, said knife being removably held on said block, and said means for reciprocating the block comprising a pair of pivoted handles, one handle having end portions

which embrace the body and block, disposed in position to hold the knife in place, said portions being connected with said block.

2. A phonograph needle cutter comprising a body, a cutting edge, a block reciprocating on said body, a knife on said block, adapted to coöperate with said edge, means for holding the needle in position between said knife and edge, means for causing said block to reciprocate relative to said body, said body being recessed to form a working space for said block, and a removable plate disposed over said space, secured at its ends to the ends of said body, holding said knife and block in operative position, provided with an opening for the end of the needle.

3. A phonograph needle cutter comprising a body, a cutting edge, a block reciprocating on said body, a knife on said block, adapted to coöperate with said edge, means for holding the needle in position between said knife and edge, means for causing said block to reciprocate relative to said body, said means for reciprocating the block having ears which overlap the edges of said knife, thereby holding the latter against displacement, and means for pivoting said ears on the sides of said block.

4. A phonograph needle cutter comprising a body, a cutting edge, a block reciprocating on said body, a knife on said block, adapted to coöperate with said edge, means for holding the needle in position between said knife and edge, and means having three parallel axes of operation for causing said block to reciprocate relative to said body, said axes being disposed respectively at the three corners of a variable triangle, said knife having motion about two of said axes, and said body having motion about the third axis.

5. A phonograph needle cutter comprising a body, a cutting edge, a block reciprocating on said body, a knife on one side of said block, adapted to coöperate with said edge, the opposite side of said block having sliding engagement with said body, means for holding the needle in position between said knife and edge, and means for causing said block to reciprocate relative to said body, said block having a portion that forms an abutment for the end of the needle, spaced a distance from the cutting edge of the knife, a recess for the cuttings between said knife and portion, said body having a smooth surface which forms a backing for said block to maintain said knife against said edge, a handle pivoted on said block to operate the cutter, said handle having means to prevent lateral displacement of said block, and means engaging the opposite ends of said block to limit the back and forth motion thereof.

6. A phonograph needle cutter compris-

ing a body, a cutting edge, a block reciprocating on said body, a knife resting flatwise against the face of said block, on said block, adapted to cooperate with said edge, means for holding the needle in position between said knife and edge, and means for causing said block to reciprocate relative to said body, the said knife having a portion which is removably inserted in said block, and a removable plate for holding said block in position, secured to said body, serving to hold the knife against outward displacement from said block.

7. A phonograph needle cutter comprising a body, a cutting edge, a block reciprocating on said body, a knife removably held in position on said block, adapted to cooperate with said edge, means for holding the needle in position between said knife and edge, and means for causing said block to reciprocate relative to said body, the means for reciprocating the block having oppositely arranged pivoted portions which extend into position to hold the knife against lateral displacement.

8. A phonograph needle cutter comprising a body, a cutting edge, a block reciprocating on said body, a knife on said block, adapted to cooperate with said edge, means for holding the needle in position between said knife and edge, and means for causing said block to reciprocate relative to said body, the means for reciprocating the block comprising a pair of handles which are pivotally connected together between their ends, one handle being pivoted on said block, and the other handle being pivoted on said body, providing three parallel axes of operation disposed at the corners of a triangle.

9. A phonograph needle cutter comprising a body, a cutting edge, a block reciprocating on said body, a resilient knife on said block, adapted to cooperate with said edge, means for holding the needle in position between said knife and edge, means for causing said block to reciprocate relative to said body, a plate for holding said knife under tension, having said edge formed by an opening therein, and means for removably securing said plate to the body, said plate holding said block in position on the body, and the tension of the knife causing constant pressure thereof against said plate and edge.

10. A phonograph needle cutter comprising cutting mechanism for trimming the worn out end of the needle obliquely thereto, a pair of handles for operation by one hand, said handles pivoted on each other, the ends of said handles being pivoted on said mechanism, said mechanism having a cutting plate disposed in a plane parallel with the axes of said handles.

11. A phonograph needle cutter comprising cutting mechanism for trimming the

worn out end of the needle obliquely thereto, a pair of handles for operation by one hand, said handles pivoted on each other, the ends of said handles being pivoted on said mechanism, a spring for moving said handles apart, said mechanism having cutting edges cooperating in a plane parallel with the axes of said handles, and stops for limiting the operation of said handles by said spring and hand.

12. A phonograph needle cutter comprising cutting mechanism for trimming the worn out end of the needle obliquely thereto, and a pair of handles for operation by one hand, said handles pivoted on each other, and the ends of said handles being pivoted on said mechanism, said mechanism including a body having the pivot of one handle, a block carrying the pivot of the other handle, sliding on said body, a knife on said block, and a plate on said body, serving to hold said block in place, provided with an edge cooperating with said knife.

13. A phonograph needle cutter comprising cutting mechanism for trimming the worn out end of the needle obliquely thereto, and a pair of handles for operation by one hand, said handles pivoted on each other, and the ends of said handles being pivoted on said mechanism, said handles having ears which embrace said mechanism, and said mechanism including a removable knife held in position by the ears of one handle.

14. A needle cutter comprising a body having a guide-way, a block arranged to reciprocate in said guide-way, a knife on said block, a plate providing a smooth surface for said knife to slide upon, said knife being disposed flatwise between said plate and said block, said plate having an opening providing an edge to cooperate with said knife, the cutting edge of said knife being beveled only on the side thereof away from said plate, means to hold the needle in said opening, means on said block to engage the end of said needle, said block and knife occupying the space between said guide-way and plate, and mechanism for relatively reciprocating said block and body, said mechanism including a pair of crossed handles, a pivotal connection between said handles, a spring for forcing said handles apart, a pivotal connection between one handle and said body, and a pivotal connection between the other handle and said body.

15. A needle cutter comprising a body having a guide-way, a block arranged to reciprocate in said guide-way, a knife on said block, a plate providing a smooth surface for said knife to slide upon, said knife being disposed flatwise between said plate and said block, said plate having an opening providing an edge to cooperate with

said knife, the cutting edge of said knife being beveled only on the side thereof away from said plate, means to hold the needle in said opening, means on said block to engage the end of said needle, said block and knife occupying the space between said guide-way and plate, and mechanism for relatively reciprocating said block and body, said mechanism including a pair of

pivoted handles, and said handles being connected with said block and body entirely at one side of the pivot. 10

Signed by me at Chicago, Illinois, this 7th day of February, 1914.

BURR B. BLOOD.

Witnesses:

RACHEL J. RICHARDSON,
ROSE E. SEHNEM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

STYLUS FOR TALKING MACHINES,
#1,211,559-----W. P. Dun Lany,
Patented-January 9th, 1917.
Filed-April 26th, 1916.

W. P. DUN LANY.
STYLUS FOR TALKING MACHINES.
APPLICATION FILED APR. 26, 1916.

1,211,559.

Patented Jan. 9, 1917.

Fig 1

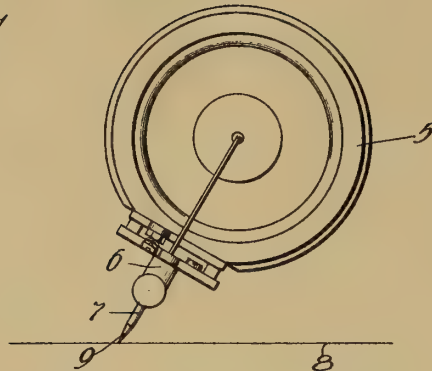


Fig. 2

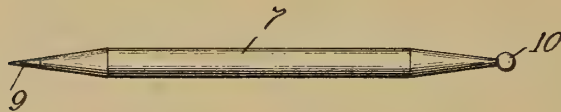


Fig. 3



Fig 4



Witnesses:

W. P. Kilroy

Harry R. L. White

Inventor

William P. Dun Lany.

By Miller, Chindahl & Parker,
attys.

UNITED STATES PATENT OFFICE.

WILLIAM P. DUN LANY, OF CHICAGO, ILLINOIS, ASSIGNOR TO SEARS, ROEBUCK AND COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF NEW YORK.

STYLUS FOR TALKING-MACHINES.

1,211,559.

Specification of Letters Patent.

Patented Jan. 9, 1917.

Application filed April 26, 1916. Serial No. 93,610.

To all whom it may concern:

Be it known that I, WILLIAM P. DUN LANY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Styli for Talking-Machines, of which the following is a specification.

In the class of talking machines using removable styli, steel needles have heretofore usually been employed. It has been found that such needles wear rapidly due to the abrasion of the record, and that flat faces are formed on the needles, thereby creating sharp edges. In order to prevent damage to the records it is necessary to change these steel needles each time after playing a record, this necessity arising especially from the fact that if a needle having the mentioned sharp edges were employed with another record, such edges might act to cut the walls of the groove and thereby injure the record and destroy the fineness of the tone reproduced thereby.

It is one of the objects of my invention to produce a stylus which is free from the disadvantages inherent in steel needles and which may be used over and over again. I have discovered that a stylus composed of iridium, or in which the record-engaging portion is iridium, may be used over and over again without affecting the shape of the record-engaging portion and without forming any sharp edges or other irregularities which would injure records.

Commercial sound records as at present manufactured fall into two classes, in one of which the sound-creating undulations are of lateral extent, being located in the sides of the grooves; and in the other class the grooves being of the "hill-and-dale" type, *i. e.* in which the undulations are located in the bottom of the groove.

When a stylus embodying my invention is to be used with a record having the undulations in the lateral walls of the sound groove, the record-engaging portion of the stylus may be made more or less pointed or tapering. For use with the other or "hill-and-dale" class of records, the record-engaging portion of the stylus may be made rounded and may comprise a substantially spherical tip portion of iridium.

It is a further object of my invention to produce, as a new article of manufacture, a

stylus adapted to be used in connection with either of the two classes of records, and which is arranged to be removably mounted in the socket or holder of a sound box so that for use with records having lateral undulations the tapered portion of the stylus may be put into service; and where a record of the "hill-and-dale" class is to be played, the stylus may be mounted in a different position to present a more or less rounded or spherical portion to coöperate with the record groove. With such a stylus all classes of records may be played on one instrument.

Referring to the accompanying drawings, Figure 1 represents a sound box which may be of any desired construction, and a stylus embodying my invention mounted in said sound box. Fig. 2 is an elevation of a stylus, on a greatly enlarged scale, provided with two record-engaging portions to adapt the stylus for use with either class of records. Fig. 3 is a fragmental elevation on a still larger scale illustrating a portion of a stylus adapted to be used on records with laterally-cut grooves, and Fig. 4 is a similar view of a portion of a stylus adapted for use with certain records of the "hill-and-dale" type.

While a stylus embodying my invention may be constructed entirely of iridium, it is more desirable, for practical reasons, to form the body portion of other material and provide only the tip or record-engaging portion of iridium. The body portion is preferably made of a metal having a relatively low fusing point, as, for example, phosphor bronze, and the iridium tip may be secured to the body in any suitable way, as by fusing the body thereto.

In the drawings, a sound box is illustrated by the reference numeral 5, 6 being the stylus-receiving socket or holder thereof. The body of the stylus is indicated by the numeral 7, and the line 8 designates the face of a record tablet. The record-engaging portion of the stylus which is adapted for laterally-cut record grooves is shown at 9 and the portion adapted for certain records of the "hill-and-dale" type at 10. In the use of the stylus, one end thereof is inserted and secured in the holder 6, leaving exposed the end which is adapted to coöperate with the kind of record to be played.

It will be understood that, if desired, a stylus having but one record-engaging portion might be permanently mounted in the

talking machine. A stylus provided with a record-engaging portion composed of iridium may be used indefinitely, the record-engaging portion being practically indestructible and incapable of injury by repeated use. The abrasion of the record on the stylus does not wear the latter and therefore the stylus never acquires rough or sharpened portions by which records might be injured.

While I prefer to use pure iridium for styli, it should be understood that I do not wish to be limited to iridium, but aim to cover in the appended claims all of the alloys and related metals, as, for example, combi-

nations thereof with others of the rarer metals of the platinum group, having the same or similar chemical and mineralogical characteristics.

I claim as my invention:

1. A stylus for talking machines composed of iridium.

2. A stylus for talking machines partially composed of iridium.

3. A stylus for talking machines having a record-engaging portion composed of iridium.

In testimony whereof, I have hereunto set my hand:

WILLIAM P. DUN LANY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

1,211,573
PHONOGRAPH,
#1,211,573----E. J. Griswold,
Patented-January 9th, 1917.
Filed-July 12th, 1916.

E. J. GRISWOLD.
 PHONOGRAPH.
 APPLICATION FILED JULY 12, 1916.

1,211,573.

Patented Jan. 9, 1917.

Fig. 1.

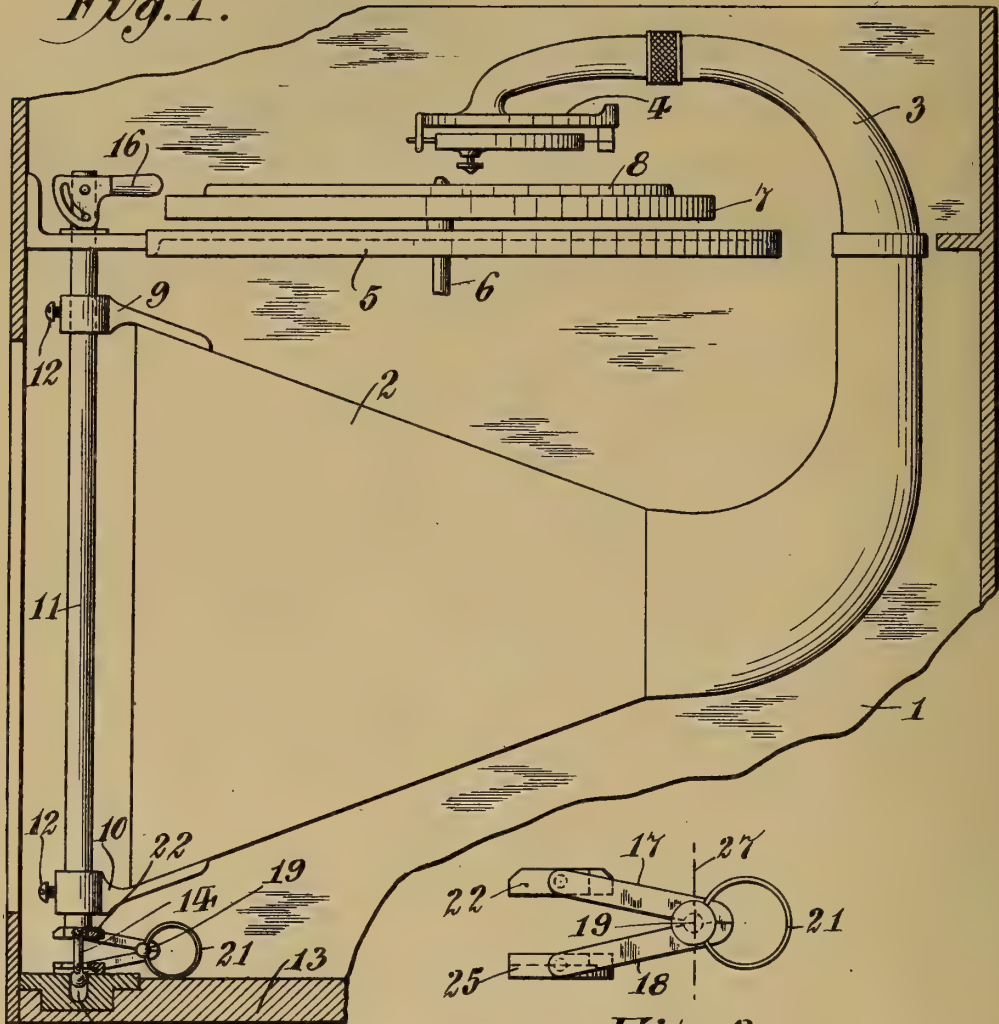


Fig. 2.

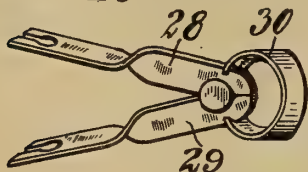
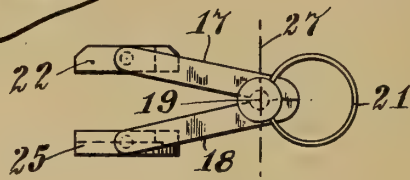


Fig. 4.

WITNESS.
Geo. H. M. H.

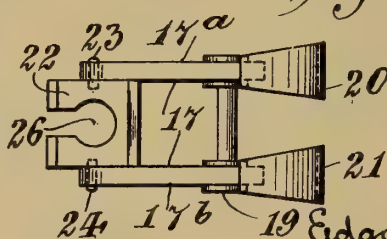


Fig. 3.

INVENTOR.
 Edgar J. Griswold
 BY
 Redding, Greeley & Goodlett
 ATTORNEYS.

UNITED STATES PATENT OFFICE.

EDGAR J. GRISWOLD, OF NEW YORK, N. Y.

PHONOGRAPH.

1,211,573.

Specification of Letters Patent.

Patented Jan. 9, 1917.

Application filed July 12, 1916. Serial No. 108,778.

To all whom it may concern:

Be it known that I, EDGAR J. GRISWOLD, a citizen of the United States, and a resident of the borough of Manhattan of the city of New York, county and State of New York, have invented certain new and useful improvements in Phonographs, of which the following is a specification, reference being had to the accompanying drawings, which form a part hereof.

This invention relates to improvements in phonographs.

The invention seeks to provide a novel and efficient shock absorber to relieve the weight of the horn, tone-arm and sound-box of a phonograph when the same are lowered into operative position with respect to a sound record.

Referring to the accompanying drawings in which the invention is illustrated, Figure 1 is a side elevation partly in section of a phonograph structure embodying the invention. Fig. 2 is a side elevation of the shock absorber. Fig. 3 is a plan view thereof. Fig. 4 is a perspective view of the shock absorber in modified form.

Referring now to the particular structure shown in the drawings, 1 is the phonograph case or frame. It contains the horn 2, tone-arm 3 and sound-box 4, these parts being rigidly connected together so as to provide a unitary structure which may be termed the sound unit.

5 is the top partition of the case through which passes the spindle 6 on which is mounted the turn table 7 carrying the sound record 8. Secured to the large end of the horn are brackets 9 and 10 which surround and are securely fixed to a spindle 11 by means of set screws 12. The spindle is arranged to rotate in bearings in the partition 5 and in the bottom wall 13 of the case. For this purpose the lower end of the spindle has preferably a reduced portion 14 which fits in an elongated recess 15. 16 is a hand operated key by means of which the spindle 11 and sound unit may be raised and lowered. These parts are shown in their elevated position in Fig. 1. When the key 16 is turned up, the spindle 11 and sound unit move to their lower position in which the needle of the sound box contacts with the record 8.

In a phonograph such as that shown in the drawings, the sound unit and spindle weigh about nine pounds. It not infre-

quently happens that when the phonograph is to be operated and the key 16 is raised, the key slips from the hand or is raised too suddenly. The sound unit, therefore, drops to its lower position and causes the needle to strike the sound record with such violence that the sound-box, sound-record and, perhaps, other parts are injured. I, therefore, provide a shock absorber for the sound unit to prevent such injury to the parts. This shock absorber comprises two levers 17, 18 pivotally mounted on the fulcrum 19. The levers are engaged on one side of the fulcrum by suitable spring means to yieldingly hold apart the ends of the levers on the opposite side of the fulcrum. In the preferred arrangement, these spring means preferably consists of a split ring spring as shown in Fig. 4, or two of such split ring springs as shown in Figs. 2 and 3. As shown in Figs. 2 and 3 the lever 17 is composed of the arms 17^a and 17^b and the lever 18 is composed of similar arms. The split rings 20 and 21 have their ends in engagement with notches cut in the levers near the fulcrum 19 and on the short ends of the levers. The springs are normally under tension.

22 is a saddle plate connected with the arms 17^a and 17^b by pivots 23 and 24.

25 is a similar saddle plate connecting the arms of the lever 18. These saddle plates are on the opposite side of the fulcrum 19 from the springs 20 and 21. Each of the saddle plates is provided with an opening which enables the spring support to be slipped into position, as shown in Fig. 1, wherein the reduced portion 14 of the spindle 11 passes through the opening of the saddle plates and the saddle plate 25 rests on the base 13 and the enlarged portion of the spindle 11 bears upon the saddle plate 22, so that the weight of the spindle and sound unit are carried by the spring support.

When the key 16 is turned down, as shown in Fig. 1, the weight of the spindle and of the sound unit are borne largely or entirely by the key 16. At this time the saddle plates 22 and 25 are separated from each other at the extreme limit of separation. When the key 16 is turned up, the weight of the spindle 11 and sound unit are brought to bear upon the shock absorber and the saddle plates 22 and 25 approach each other. As these saddle plates approach each other, the ends of the springs 20 and 21 separate

and the tension of the springs increases. This increased tension, however, is compensated for by the fact that the ends of the springs are necessarily brought nearer to the normal line 27 passing through the fulcrum 19 so that the resistance of the shock absorber to the weight brought to bear upon it remains nearly uniform as the saddle plates 22 and 25 approach each other under the weight of the sound unit and spindle 11.

In Fig. 4 the levers 28 and 29 are formed of metal strips whose ends remote from the split ring spring 30 are twisted through an arc of 45° to provide saddles at these ends of the levers. In this form only one spring ring is used and pivoted saddles are obviated. This reduces the cost of manufacturing the device.

Heretofore, a coiled spring has been employed to take part of the weight of the sound unit, but such spring has been so arranged that its resistance to the weight of the sound unit rapidly increased when such weight was brought to bear upon the spring. It was necessary to limit the maximum resistance of the spring in order that, when the full weight of the sound unit bore upon it, the needle might be in proper contact with the sound record. As a result, the initial resistance of the spring was too small and when the key, such as the key 16, was suddenly released or slipped from the hand as often happened, the spring gave way entirely under the momentum of the falling sound unit and the needle struck the sound record with such force as to injure the sound-box, sound-record and perhaps other parts. With the spring support above described, the resistance of the spring, in the preferred form of the support, is substantially uniform and its initial resistance to the weight of the sound unit is such that the sound unit cannot drop suddenly to its lowest position. Hence, if the key 16 is suddenly released, no injury to the parts can occur. This is one of the important features of the invention herein described.

The shock absorber may be placed in any suitable position so as to take the weight of the sound unit.

What I claim is:

1. The combination with a phonograph horn of a shock absorber therefor comprising a pair of levers; a fulcrum on which the levers are pivoted; and spring means engaging the levers on one side of the fulcrum to yieldingly hold apart the ends of the levers on the opposite side of the fulcrum, the weight of the horn bearing upon said last mentioned ends of the levers.

2. The combination with a phonograph horn of a shock absorber therefor comprising a pair of levers; a fulcrum on which the levers are pivoted; and a split ring spring

engaging the levers on one side of the fulcrum to yieldingly hold apart the ends of the levers on the opposite side of the fulcrum, the weight of the horn bearing upon said last mentioned ends of the levers.

3. In a phonograph the combination of a sound unit comprising a sound-box, tone-arm and horn forming a unitary structure; a spindle mounted in bearings and to which the sound unit is attached; means for raising and lowering the spindle and sound unit; and a shock absorber for the spindle and sound unit comprising a pair of levers, a fulcrum on which the levers are pivoted, and spring means engaging the levers on one side of the fulcrum to yieldingly hold apart the ends of the levers on the opposite side of the fulcrum, the weight of the spindle and sound unit bearing upon said last mentioned ends of the levers.

4. In a phonograph the combination of a sound unit comprising a sound-box, tone-arm and horn forming a unitary structure; a spindle mounted in bearings and to which the sound unit is attached; means for raising and lowering the spindle and sound unit; and a shock absorber for the spindle and sound unit comprising a pair of levers, a fulcrum on which the levers are pivoted, and a split ring spring engaging the levers on one side of the fulcrum to yieldingly hold apart the ends of the levers on the opposite side of the fulcrum, the weight of the spindle and sound unit bearing upon said last mentioned ends of the levers.

5. The combination with a phonograph horn of a shock absorber therefor comprising a pair of levers; a fulcrum on which the levers are pivoted; and spring means engaging the levers on one side of the fulcrum to yieldingly hold apart the ends of the levers on the opposite side of the fulcrum, the weight of the horn bearing upon said last mentioned ends of the levers and said spring means being so arranged as to offer a nearly uniform resistance to the weight of the horn.

6. The combination with a phonograph horn of a shock absorber therefor comprising a pair of levers; a fulcrum on which the levers are pivoted; and a split ring spring engaging the levers on one side of the fulcrum to yieldingly hold apart the ends of the levers on the opposite side of the fulcrum, the weight of the horn bearing upon said last mentioned ends of the levers and said split ring spring being so arranged as to offer a nearly uniform resistance to the weight of the horn.

7. In a phonograph the combination of a sound unit comprising a sound-box, tone-arm and horn forming a unitary structure; a spindle mounted in bearings and to which the sound unit is attached; means for raising and lowering the spindle and sound unit; and a shock absorber for the spindle and

5 sound unit comprising a pair of levers, a fulcrum on which the levers are pivoted, and spring means engaging the levers on one side of the fulcrum to yieldingly hold apart the ends of the levers on the opposite side of the fulcrum, the weight of the spindle and sound unit bearing upon said last mentioned ends of the levers, and said spring means being so arranged as to offer a nearly uniform resistance to the weight of the sound unit and spindle.

10 8. In a phonograph the combination of a sound unit comprising a sound-box, tone-arm and horn forming a unitary structure; a spindle mounted in bearings and to which the sound unit is attached; means for raising

and lowering the spindle; and a shock absorber for the spindle and sound unit comprising a pair of levers, a fulcrum on which the levers are pivoted, and a split ring 20 spring engaging the levers on one side of the fulcrum to yieldingly hold apart the ends of the levers on the opposite side of the fulcrum, the weight of the spindle and sound unit bearing upon said last mentioned ends 25 of the levers, and said split ring spring being so arranged as to offer a nearly uniform resistance to the weight of the sound unit and spindle.

This specification signed this 11th day of July, A. D. 1916.

EDGAR J. GRISWOLD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents Washington, D. C."

1,211,584

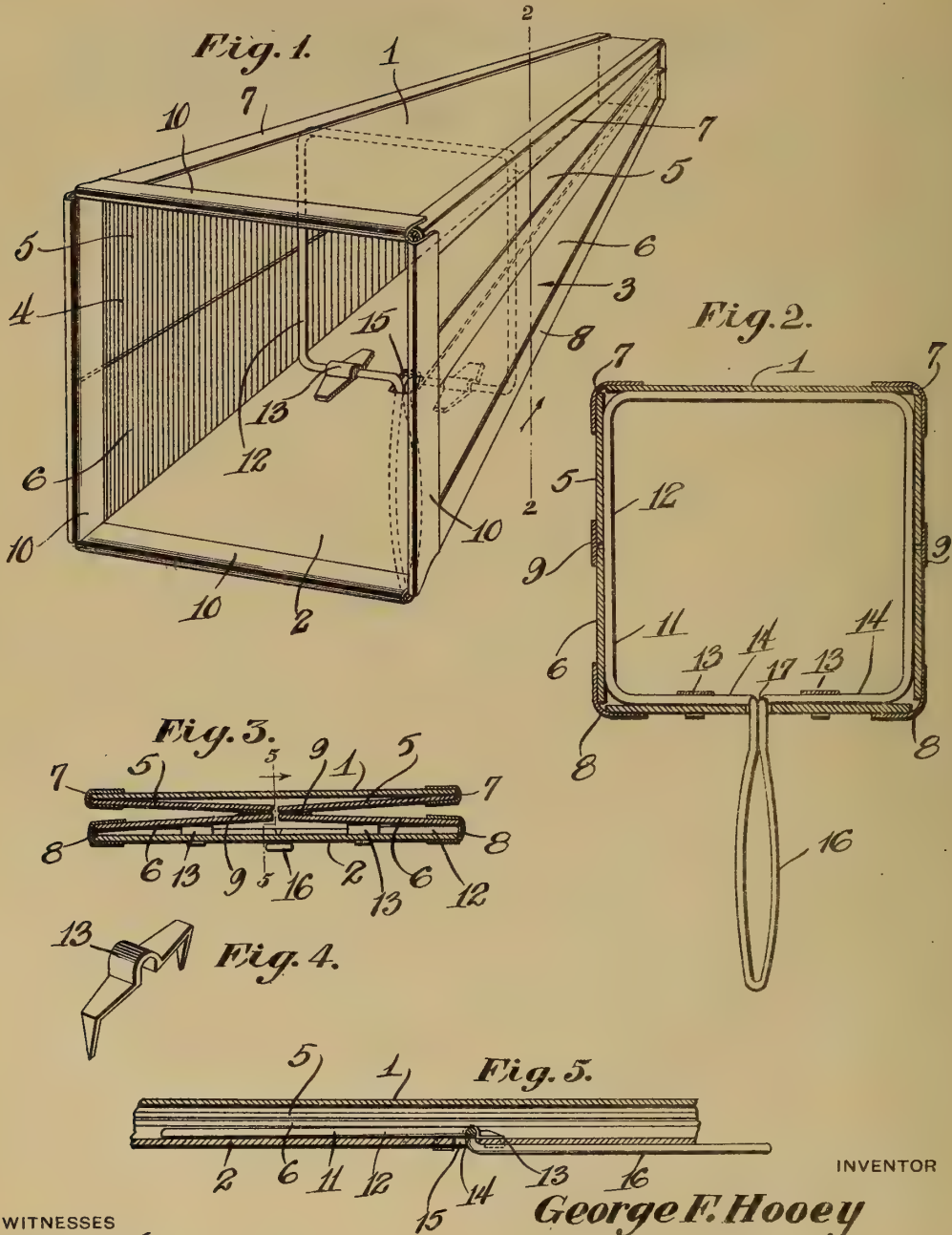
COLLAPSIBLE MEGAPHONE,

#1,211,584-----G. F. Hooey,
Patented-January 9th, 1917.
Filed-June 2nd, 1916.

G. F. HOOEY.
COLLAPSIBLE MEGAPHONE.
APPLICATION FILED JUNE 2, 1916.

1,211,584.

Patented Jan. 9, 1917.



WITNESSES

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INVENTOR

George F. Hooey

BY

Richard A. Owen

ATTORNEY

UNITED STATES PATENT OFFICE.

GEORGE F. HOOEY, OF SECHELT, BRITISH COLUMBIA, CANADA.

COLLAPSIBLE MEGAPHONE.

1,211,584.

Specification of Letters Patent.

Patented Jan. 9, 1917.

Application filed June 2, 1916. Serial No. 101,380.

To all whom it may concern:

Be it known that I, GEORGE F. HOOEY, a subject of the King of Great Britain, residing at Sechelt, in the Province of British Columbia and Dominion of Canada, have invented certain new and useful Improvements in Collapsible Megaphones, of which the following is a specification.

This invention relates to a folding or collapsing megaphone and more particularly to a megaphone having a structure of pyramidal formation, two of the opposite sides of which are adapted to fold or collapse whereby the structure may be confined within a minimum space.

As a further object of the invention the device is provided with manually operated means by which the structure may be held in operative position, the operating means being adapted to be disposed in a position where it will be interposed and confined in a minimum space when the megaphone is in folded position.

A further object of the invention is the provision of a pyramidal structure having hinged portions or sides by which the several sections constituting the structure may be compactly folded; the hinges comprising a plurality of longitudinally extending strips of fabric fastened to the sections in any desired manner.

A further object of this invention is the provision of a megaphone which consists of comparatively few parts and is simple in construction, but durable and well adapted to withstand the rough usage to which devices of this character are ordinarily subjected.

For a full description of the invention and the advantages and merits thereof, reference is to be had to the following description and the accompanying drawings, wherein is illustrated the preferred form of my invention, in which:

Figure 1 is a perspective view showing the megaphone in operative position. Fig. 2 is a vertical transverse section on the line 2—2 of Fig. 1. Fig. 3 is a vertical transverse section showing the structure in collapsed position. Fig. 4 is a perspective view of a detail of the invention. Fig. 5 is a fragmentary vertical longitudinal section on the line 5—5 of Fig. 3.

While it is customary to construct a megaphone of conical formation, I have found that the same results may be obtained by

constructing the megaphone of pyramidal formation.

The structure comprising the megaphone consists of side walls 1 and 2 which, for the purposes of this description will be termed the upper wall 1 and the lower wall 2; this being the position of the walls when the megaphone is in operative position. Side walls 3 and 4 are each divided into collapsible sections 5 and 6 and the upper edges of the collapsible sections 5 are connected to the upper wall 2 by means of longitudinally extending strips 7 of fabric or other suitable pliable material. These strips 7 are secured to the wall 1 and the collapsible sections 5 by an adhesive or other suitable fastening means and, as shown by Figs. 2 and 3 of the drawing the corners or edges of the walls are disposed in a position relative to each other whereby the strips 7 act as hinges and allow the collapsible sections 5 to fold or swing inwardly as shown by Fig. 3 of the drawing. The edges of the lower collapsible section 6 are secured to the lower wall 2 in a similar manner, by the longitudinal strips 8.

In order that the meeting edges of the collapsible sections 5 and 6 may be hinged together I connect the adjacent edges of the collapsible sections with strips 9 of fabric or other suitable pliable material, the fabric being fastened to the sections by an adhesive or other suitable fastening means. The end of each of the walls is provided with reinforcing strips 10 which are also made of fabric and fastened by means of an adhesive and are designed to prevent the edges from becoming injured while the device is in use. It is pointed out in this connection that the walls of the megaphone are constructed of card-board or other suitable light material and the bracing of the edges thereof is provided to prevent injury to the fragile card-board.

For holding the structure comprising the megaphone in operative position, the frame 11 is provided which consists of a square brace frame 12 which is disposed within the megaphone and adapted to contact with each of the walls thereof when in operative position. The lower wall 2 of the structure is provided with a pair of bearings 13 which receive the lower arms 14 of the frame. The lower wall 2 is also provided with an opening 15 and the handle 16 of the frame projects downwardly through the opening 15 where it may be grasped by the operator to

move the frame into or out of operative position.

By referring to Fig. 5 of the drawing it will be observed that the handle 16, where it joins the frame 12 is curved almost at right angles as at 17 and this structure allows the frame and handle to lie snugly against the wall 2 when the megaphone is in collapsible position.

The frame is constructed of a single strand of heavy wire and the handle 16 is provided, by bending downwardly the strand of wire, as shown by Fig. 2 of the drawing. The bearings 13 are constructed of any suitable thin metallic material and, as shown in detail in Fig. 4, each consists of the arcuate bearing portion and the plate, which rests upon the wall 2, and have downwardly bent terminals to provide prongs which may be folded or bent on the outer side of the wall 2 for holding the bearing in position.

To operate the megaphone, for moving it into collapsible or folded position, it is merely necessary to swing the handle 16 upwardly until it contacts with the wall 2 which will cause the frame 12 to swing downwardly and lie flat against the inner side of the wall 2. The collapsible side sections 5 and 6 are then folded inwardly as shown by Fig. 3 and the device is thereby placed in folded position for conveniently carrying the same.

In reduction to practice I have found that the form of my invention illustrated in the drawings and referred to in the above description, as the preferred embodiment, is the most efficient and practicable; yet realizing that the conditions concurrent with the adoption of my device will necessarily vary, I desire to emphasize the fact that various minor changes in the details of construction, proportion and arrangement of parts may be resorted to, when required, without sacrificing any of the advantages of my invention, as defined in the appended claims.

I claim:

1. A collapsible megaphone, comprising a frusto pyramidal structure, comprising four walls of substantially rectangular configuration in cross section, the said walls being collapsible, and a rectangular frame pivotally mounted on one of the walls and adapted to engage all of the said walls when in operative position.

2. A collapsible megaphone, comprising four tapered walls, hinges joining the meeting edges of the walls, two of the walls being divided into sections for permitting the same to be folded between the adjacent

walls, and collapsible bracing means embraced by the said walls for holding the same in operative position.

3. A collapsible megaphone, comprising four tapered walls, hinges joining the meeting edges of the walls, two of the walls being divided into sections for permitting the same to be folded between the adjacent walls, collapsible bracing means embraced by the said walls for holding the same in operative position, one of the said walls having an aperture formed therein, and a handle disposed on the exterior of one of the walls and associated with the said collapsible bracing means for operating the said means from without the megaphone.

4. A collapsible megaphone, comprising a plurality of tapered walls, some of the said walls being centrally longitudinally divided, hinge elements secured to the meeting edges of the said divided wall and to the adjoining edges of the said main tapered walls, and collapsible bracing means embraced by the said walls and adapted to be disposed for holding the said walls in rigid open position.

5. A collapsible megaphone, comprising a plurality of tapered walls, two of said walls being centrally divided to provide collapsible sections, hinges connecting the edges of said walls and the meeting edges of said collapsible sections, a brace frame pivotally mounted on one of said walls and disposed in the space between said walls, and an operating handle for said frame.

6. A collapsible megaphone, comprising a plurality of tapered walls, two of said walls being centrally divided to provide collapsible sections, hinges connecting the edges of said walls and the meeting edges of said collapsible sections, a brace frame comprising a square frame formed of a single strand of wire, bearings carried by one of said walls and pivotally receiving a portion of said frame whereby said frame may be swung into or out of engagement with the inner sides of said walls, a handle integrally formed with said frame and extending downwardly through an opening in one of said walls, the end of said handle where it joins said frame being curved to permit the said frame and said handle to lie snugly against said wall.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE F. HOOEY.

Witnesses:

M. H. TEBB,
THOS. LAURIE.

PHONOGRAPH REPRODUCER,
#1,211,874-----A. N. Pierman,
Patented-January 9th, 1917.
Filed-July 19th, 1913.

A. N. PIERMAN.
 PHONOGRAPH REPRODUCER.
 APPLICATION FILED JULY 19, 1913.

1,211,874.

Patented Jan. 9, 1917.

Fig. 1

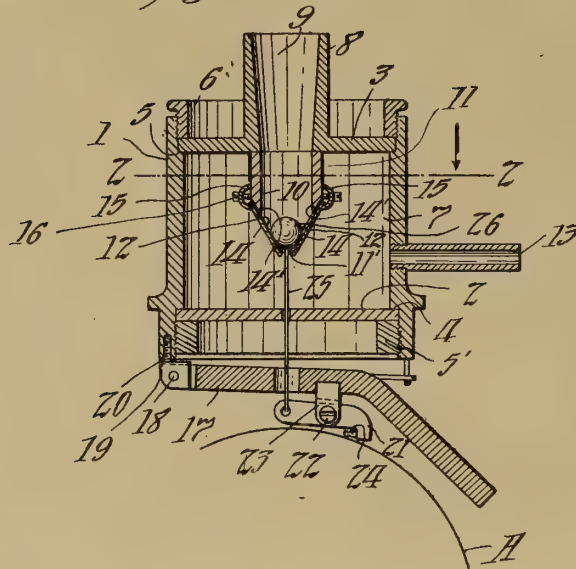


Fig. 5.

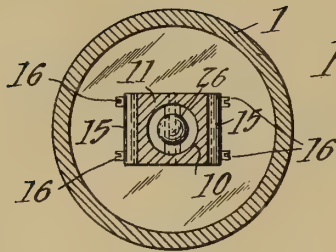
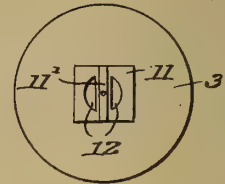


Fig. 7

Fig. 4

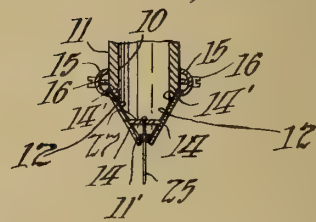
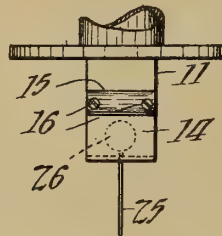


Fig. 3



Witnesses:

Addresser
Frederick Pachmann.

Inventor:

Alexander N. Pierman
by Dyer & Holden

His Attys

UNITED STATES PATENT OFFICE.

ALEXANDER N. PIERMAN, OF NEWARK, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH-REPRODUCER.

1,211,874.

Specification of Letters Patent. Patented Jan. 9, 1917.

Application filed July 19, 1913. Serial No. 779,917.

To all whom it may concern:

Be it known that I, ALEXANDER N. PIERMAN, a citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Phonograph-Reproducers, of which the following is a description.

My invention relates to phonograph reproducers of the pneumatic type, that is of the type in which undulations corresponding to sound waves are impressed upon a current of any suitable moving fluid by the operation of a suitable valve, the valve being operated in accordance with sound waves, as by connection with a reproducing stylus tracking a record groove.

The principal object of my invention is to provide an improved reproducer of the class described whereby an improved quality of sound reproduction can be obtained.

Other objects of my invention will appear more fully in the following specification and appended claims.

In order that my invention may be more clearly understood, attention is hereby directed to the accompanying drawing forming a part of this specification and in which—

Figure 1 is a view partly in vertical section and partly in side elevation of a sound reproducer embodying my invention; Fig. 2 is a section thereof taken on the line 2—2 of Fig. 1; Fig. 3 is a side view showing a detail of construction; Fig. 4 is a vertical sectional view showing a modification of my invention; and Fig. 5 is a bottom plan view of the port member forming a part of the reproducer.

In all the views, like parts are designated by the same reference numerals.

Referring to the drawing, the sound box body comprises a cylindrical member 1, the ends of which are closed by plates or other suitable closures 2 and 3. These plates or closures are seated against shoulders 4 and 5 respectively and are respectively held in place by rings 5' and 6 threaded within the ends of the member 1. A hollow chamber 7 is thus formed within the sound box body between the plates 2 and 3. A reproducer neck 8 extending upwardly from the plate

3 has a passage 9 extending therethrough, this passage communicating with the interior 10 of the chamber-like part 11 on the under side of the plate 3. The interior of the part 11 communicates with the chamber 7 through ports 12 formed in the said part. The outer surfaces on the part 11 through which the ports 12 open into the chamber 7 are inclined to each other and also inclined at an acute angle to the vertical axis of the sound passages or openings 9 and 10. The fluid upon which the sound vibrations are to be impressed is passed into the chamber 7 through a conduit 13, and out of said chamber through the ports 12 and the openings 10 and 9; if desired, however, the fluid may be passed through the reproducer in the reverse direction. Valves 14, 14 are provided for regulating the passage of fluid through the ports 12 and for impressing the sound vibrations on said fluid, these valves being spaced from the inclined walls of the part 11 through which the ports 12 open into the chamber 7 by any suitable means, such as strips of paper 14', shown in the drawing between the upper ends of the valves and the part 11. The upper ends of the valves may be secured in position by means of clamping members 15 engaging the outer surfaces of the valves and secured to the part 11, as by means of screws 16.

I prefer to construct the valves 14 of plates of a material having a high elasticity, such as glass, so that by their quick action they may readily follow all of the undulations in the record to be reproduced. The thickness of the valve should be such as to permit the proper flexing or vibration thereof and at the same time to produce the desired tonal qualities, a thick valve producing a higher pitch than a thinner valve. When the valve is made of glass, I prefer to make the same between .004 and .005 of an inch thick, although good results may be obtained with valves ranging from .003 to .012 of an inch in thickness. The thickness of the paper or other spacing material 14' should be such as to hold the valves spaced from the ports at their lower ends a sufficient distance to permit the same to vibrate freely on both sides of their normal position when set into vibration in accordance with the vibrations of

the sound record. A suitable thickness for the paper or spacing material is .001 of an inch.

The valve operating mechanism comprises the following: A floating weight 17 is pivotally mounted as shown at 18 upon a pivot block 19 which is secured to the lower portion of the sound box body, as by a screw 20. A stylus lever 21 is pivoted at 22 to lugs 23 depending from floating weight 17. Stylus lever 21 carries stylus 24 adapted to track the undulations of the sound record A, and the tail of the lever 21 is connected to a vertical link 25 having at its upper end a spherical enlargement 26 bearing against the inner faces of the valves for operating the same. The weight 17 and the pressure of the fluid in the chamber 7 should be such that their effects on the valves 14 tend to balance each other. The upper part of link 25 passes through an opening in the bridge 11' which extends horizontally across the bottom of the part 11 and is guided in its vertical movement by said bridge.

In the operation of my improved device, air is admitted through the conduit 13 into the chamber 7 and the stylus 24 caused to traverse the undulations of the record A; whereupon the enlargement 26 is moved upwardly and downwardly by means of the stylus lever and the link 25 and exerts a wedging action on the valves 14 to force the same apart and away from the ports 12, the elasticity of the valves being sufficient to move the same toward the ports 12 upon the upward movement of the link 25 and enlargement 26. In this way the extent of opening of the ports 12 is varied in accordance with the sound vibrations or undulations in the record A and these vibrations or undulations are impressed upon the fluid passing through the ports 12, the said fluid then passing through the chamber 10 and opening 9, which latter may, if desired, communicate with a sound amplifying horn of any suitable construction. By inclining the valves 14 toward the axis of the chamber 11 and the opening 9 and causing the same to be moved into open position by wedging action, very little power is required to operate the valves. The facility of operation of the valves is also increased by the fact that, instead of being movable directly in the direction of the fluid passing into the chamber 10, they are movable at an angle to the said direction and are therefore not hastened or retarded to any large extent in their movement by the movement of the fluid.

In the modification shown in Fig. 4, the spherical enlargement 26 of the device shown in Figs. 1 and 2 is replaced by a flat plate 27.

Various other means may obviously be used to operate the valves in accordance with my invention.

While two valves are shown in the drawing any other suitable number may obviously be employed. Many other changes may likewise be made without departing from the spirit of my invention.

What I claim as new and desire to protect by Letters Patent is as follows:

1. In a phonograph reproducer, the combination of a hollow body having a port, a valve for said port, and means comprising a member movable along the face of said valve to shift the latter relatively to said port for varying the extent of opening of said port, substantially as described.

2. In a phonograph, the combination of a hollow body having a port, a flexible valve for said port, and means arranged to flex said valve by wedging action thereon to vary the extent of opening of said port in accordance with sound vibrations, substantially as described.

3. In a phonograph, the combination of a hollow body having a port, a flexible valve of high elasticity for said port, and means arranged to flex said valve by wedging action thereon to vary the extent of opening of said port in accordance with sound vibrations, substantially as described.

4. In a phonograph, the combination of a hollow body having a port, a flexible glass valve for said port, and means arranged to flex said valve by wedging action thereon to vary the extent of opening of said port in accordance with sound vibrations, substantially as described.

5. In a phonograph reproducer, the combination of a hollow body adapted to permit the passage of fluid therethrough, a plurality of valves inclined to each other for controlling the passage of fluid through said body, and means comprising a single member coacting with said valves for operating the latter by wedging action thereon to impress on the fluid passing through said body vibrations corresponding to sound waves, substantially as described.

6. In a phonograph reproducer, the combination of a hollow body having ports inclined to each other, flat valve plates for said ports, and means for moving said valve plates apart to vary the extent of opening of said ports in accordance with sound vibrations, substantially as described.

7. In a phonograph reproducer, the combination of a hollow body adapted to permit the passage of fluid therethrough, a plurality of valves for controlling the passage of fluid through said body, and means for operating said valves by wedging action thereon to impress on the fluid passing through said body vibrations corresponding to sound waves, substantially as described.

8. In a phonograph reproducer, the combination of a hollow body adapted to permit the passage of fluid therethrough, a plural-

ity of valves inclined to each other for controlling the passage of fluid through said body, and means for operating said valves by wedging action thereon to impress on the
5 fluid passing through said body vibrations corresponding to sound waves, substantially as described.

9. In a phonograph reproducer, the combination of a hollow body having ports inclined to each other, flat valves for said
10 ports, a stylus, and means connecting said stylus and said valves for moving said valves apart to vary the extent of opening of said ports in accordance with sound vibrations,
15 substantially as described.

10. In a phonograph reproducer, the combination of a hollow body having ports, valves for said ports, and means for wedging said valves apart to vary the extent of
20 opening of said ports in accordance with sound vibrations, substantially as described.

11. In a phonograph reproducer, the combination of a hollow member having a passage therethrough, a valve for controlling
25 the movement of fluid through said passage, said valve being inclined at an acute angle to said passage, and means for operating said valve by wedging action to impress on the fluid passing through said member vibrations corresponding to sound waves, sub-
30 stantially as described.

12. In a phonograph reproducer, the combination of a hollow member having a passage therethrough, a plurality of valves for
35 controlling the movement of fluid through said passage, said valves being inclined at an acute angle to said passage, and means for operating said valves by wedging action to impress on the fluid passing through
40 said member vibrations corresponding to sound waves, substantially as described.

13. In a phonograph reproducer, the combination of a member having a port and a

passage leading to said port, a valve movable toward and away from said port for
45 controlling the flow of fluid through said passage and port, said valve and the surface of said member adjacent said valve being arranged at an acute angle to said pas-
50 sage, and means for moving said valve at an angle to said passage to impress on the fluid vibrations corresponding to sound waves, substantially as described.

14. In a phonograph reproducer, the combination of a member having a plurality of
55 ports and a passage leading to said ports, a valve movable toward and away from each of said ports for controlling the flow of fluid through said passage and ports, said valves being arranged at an acute angle to
60 said passage, and means for moving said valves at an angle to said passage to impress on said fluid vibrations corresponding to sound waves, substantially as described.

15. In a phonograph reproducer, the combination of a hollow body having ports,
65 valves for said ports, and means comprising a spherical member engaging said valves for moving the latter apart to vary the extent of opening of said ports in accordance
70 with sound vibrations, substantially as described.

16. In a phonograph reproducer, the combination of a hollow body having ports,
75 valves inclined to each other, and means for moving said valves apart by wedging action to vary the extent of opening of said ports in accordance with sound vibrations, substantially as described.

This specification signed and witnessed
80 this 17th day of July, 1913.

ALEXANDER N. PIERMAN.

Witnesses:

FREDERICK BACHMANN,
MARY J. LAIDLAW.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

NEEDLE CUTTER.

#1,212,292-----S.O:Wade,

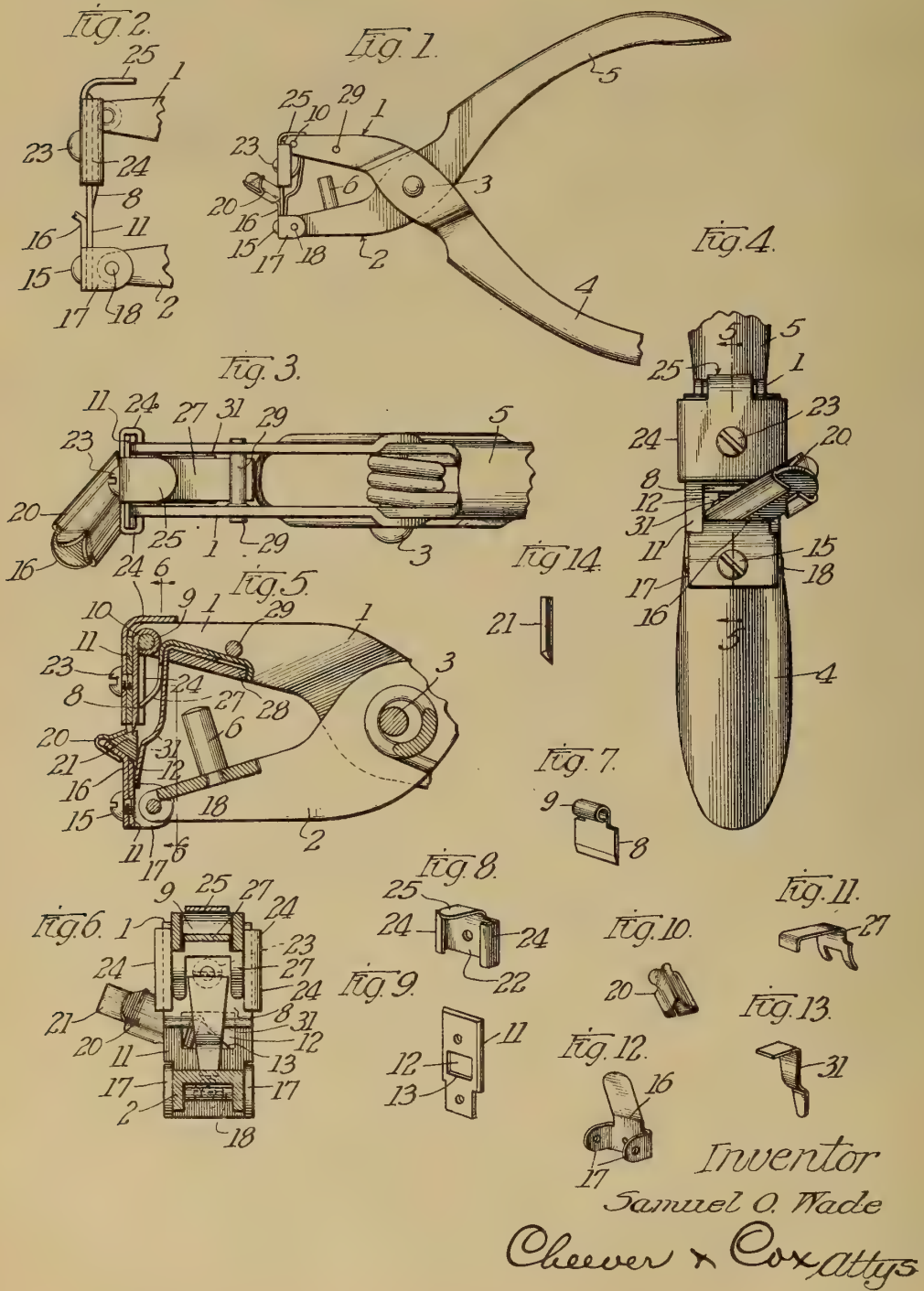
Patented-January 16th, 1917.

Filed-June 24th, 1915.

S. O. WADE.
NEEDLE CUTTER.
APPLICATION FILED JUNE 24, 1915.

1,212,292.

Patented Jan. 16, 1917.



UNITED STATES PATENT OFFICE.

SAMUEL O. WADE, OF CHICAGO, ILLINOIS.

NEEDLE-CUTTER.

1,212,292.

Specification of Letters Patent.

Patented Jan. 16, 1917.

Application filed June 24, 1915. Serial No. 36,051.

To all whom it may concern:

Be it known that I, SAMUEL O. WADE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Needle-Cutters, of which the following is a specification.

My invention relates to needle cutters for sharpening the so called "fiber" needles of phonographs and talking machines.

The general object of the invention is to provide simple, efficient and inexpensive means for producing a clean sharp cut on a needle of this character.

Contributory to the general object it is my purpose to provide a construction such that the cutting parts may be mounted upon ordinary pivoted pliers in distinction to those more complicated and expensive pliers which are sometimes known as "parallel motion pliers."

Again it is my purpose to provide a construction in which the cutting parts are pivotally connected to their respective jaws and to provide means for keeping the cutting parts at all times in alinement with each other without strain or undue friction, the cutting parts continuously alining themselves, so to speak, with the chord of the arc made by the ends of the jaws in swinging toward and from each other.

Another purpose of my invention is to provide a simple and advantageous stop for limiting the distance to which the needle may be inserted into the device preparatory to taking the cut.

Other ancillary objects will be apparent from the following description.

I accomplish my objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side view of a cutter embodying my invention. Fig. 2 is a side view drawn to an increased scale showing the cutting parts and the associated ends of the jaws on which they are mounted. Fig. 3 is an enlarged top plan view of the operating parts of the device. Fig. 4 is an end view looking toward the right in Fig. 3. Fig. 5 is a vertical section on the line 5—5, Fig. 4. Fig. 6 is a vertical section taken on the line 6—6, Fig. 5. Figs. 7 to 13 inclusive, are component elements of the device and Fig. 14 is a view of the pointed needle.

Similar numerals refer to similar parts throughout the several views.

The upper jaw 1 and lower jaw 2 of the pliers are pivoted on the pin 3 and provided respectively with handles 4 and 5. A stop 6 is mounted upon one of the jaws for limiting the degree of closure.

A knife 8, shown separately in Fig. 7, has an eye 9 formed at its upper end for receiving a pin 10 by which said knife is pivoted to the upper jaw. This knife slides vertically along the inner face of a plate 11, shown separately in Fig. 9. This plate has an opening 12 for receiving the needle and permitting it to pass through to a point where it may be reached by the descending knife. The needle is backed up, that is, held in position and prevented from receding as the knife approaches, by the lower edge 13 of said opening. The plate 11 may thus be regarded as a face plate having a port for receiving the end of the needle and supporting the same while the cut is being taken. Said face plate is fastened by a screw 15, or other suitable means, to a holder 16 shown separately in Fig. 12. In the particular design illustrated, this holder has two ears 17, which receive a pin 18 by which said holder is pivoted to the lower jaw as best shown in Figs. 1, 2, 5 and 6.

A guide 20, shown separately in Fig. 10, is fastened to the holder 16 for guiding the needle 21 (see Fig. 14) to the opening 12 in the face plate 11. A guide 22, shown separately in Fig. 8, is fastened by a screw 23 or otherwise to the upper part of face plate 11 and has lateral flanges 24 which bend around over the edges of the face plate and of the knife, backing up the knife and causing it to travel parallel with the face plate. The upper end 25 of said guide bends inward over the upper jaw 1 and forms a stop for limiting the spread of the jaws.

The knife is held in close frictional contact with the back of the face plate as the two travel relatively to each other by a spring 27 shown separately in Fig. 11. This spring is supported upon a cross bar 28 located in the upper jaw as clearly shown in Fig. 5. The spring is held seated upon said cross bar by a transverse pin 29 overlying the tail of said spring.

The distance to which the needle may be inserted into the holder is limited by a stop 31 shown separately in Fig. 13. This stop also seats upon the cross bar 21 and is held in position thereon by the spring 27 which overlies it as shown in Fig. 5. This method

of mounting the needle stop and the knife spring is a very simple and advantageous one, the stop 31 requiring no other fastening means than the spring coöperating with the cross bar, and the spring being held in place chiefly by the pin 29 and the fact that the spring is configured to grip the cross bar.

In operation, when the needle is inserted to take the cut, the inner end is arrested by the stop 31. The operator then slowly forces the jaws toward each other, causing the knife to descend and shave off a portion of the inner end of the needle. As the needle is firmly backed up by the edge 13 of the face plate, and as the cutting edge of the knife is held in close contact with the back of the face plate, the knife takes a good clean cut and produces a sharp point on the needle, the edge 13 preventing the formation of a sliver or feather edge at the needle point. It will be noted that in my construction the knife is pivotally connected to one jaw and the face plate and guide pivotally connected to the other jaw. The result is that these parts always aline themselves along the chord of the arc described by the ends of the jaws as they swing toward and from each other. As both of the parts are pivoted, the rotary movement about the pivots is equally distributed instead of being confined either at the knife or at the guide. In consequence the tool works with great smoothness and all cramping action such as might occur if the knife at any point of its travel assumed an oblique position relatively to the face plate is avoided. It will be noted that this is all accomplished in connection with pliers of the simple pivot type in distinction to those more expensive and complicated pliers in which the ends of the jaws are separate pieces and connected to the handles by a parallel motion. It will also be noted that in my construction the pivot points by which the knife and the face plate are connected to the jaws, are inside of the plane of the knife and face plate, that is to say, the knife and the face plate are pivoted to the jaws at a point closer to the main pivot of the pliers than the plane in which the knife and the face plate lie. The result is that the pressure exerted by the jaws in cutting is not in the direct plane of the cut, but is inside thereof, that is, nearer to the central

pivot of the pliers, the result being that there is an element or portion of the force normal (that is perpendicular) to the face of the plate, and this element of the force tends to keep the blade in close contact with the face plate, thereby insuring a clean cut and a sharp point on the end of the needle.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a needle cutter, the combination of a pair of pliers, a knife pivoted to the outer end of one of the jaws, a face plate pivoted to the outer end of the other of the jaws of the pliers, and a guide fastened to the face plate and having flanges passing around the edges of the knife blade for guiding the same parallel to the face plate.

2. In a needle cutter, in combination, a pair of simple pliers hinged at a single point, a knife blade pivotally connected to the end of one jaw of the pliers, a face plate coöperating with said blade and having an opening therein for receiving the needle, said face plate being pivoted to the other jaw of the pliers, and a guide having flanges for guiding the knife parallel to the face plate, said guide being fastened to said face plate.

3. In a needle cutter, in combination, a pair of pliers pivotally connected together, a cutting blade pivoted to one of the jaws thereof, a face plate pivotally connected to the other jaw of the pliers and having an opening therein for receiving the inner end of the needle, one edge of said opening supporting the needle in opposition to the pressure of the blade in taking the cut, and a spring fastened to the jaw which supports the blade and pressing against the back of the blade to hold it in contact with the inner surface of the face plate.

4. In a needle cutter, in combination, a pair of pliers, a knife pivoted to one jaw thereof, a face plate pivoted to the other jaw thereof, a cross bar fastened to the jaw which supports the knife, and a spring fastened to said bar and abutting the back of the knife to hold the same pressed against the surface of the face plate, substantially as described.

In witness whereof, I have hereunto subscribed my name.

SAMUEL O. WADE.

MEANS FOR SECURING A SOUND BOX TO THE
TONE ARM OF TALKING MACHINES,

#1,212,309-----H.W.Archer,
Patented-January 16th, 1917.
Filed-May 19th, 1915.

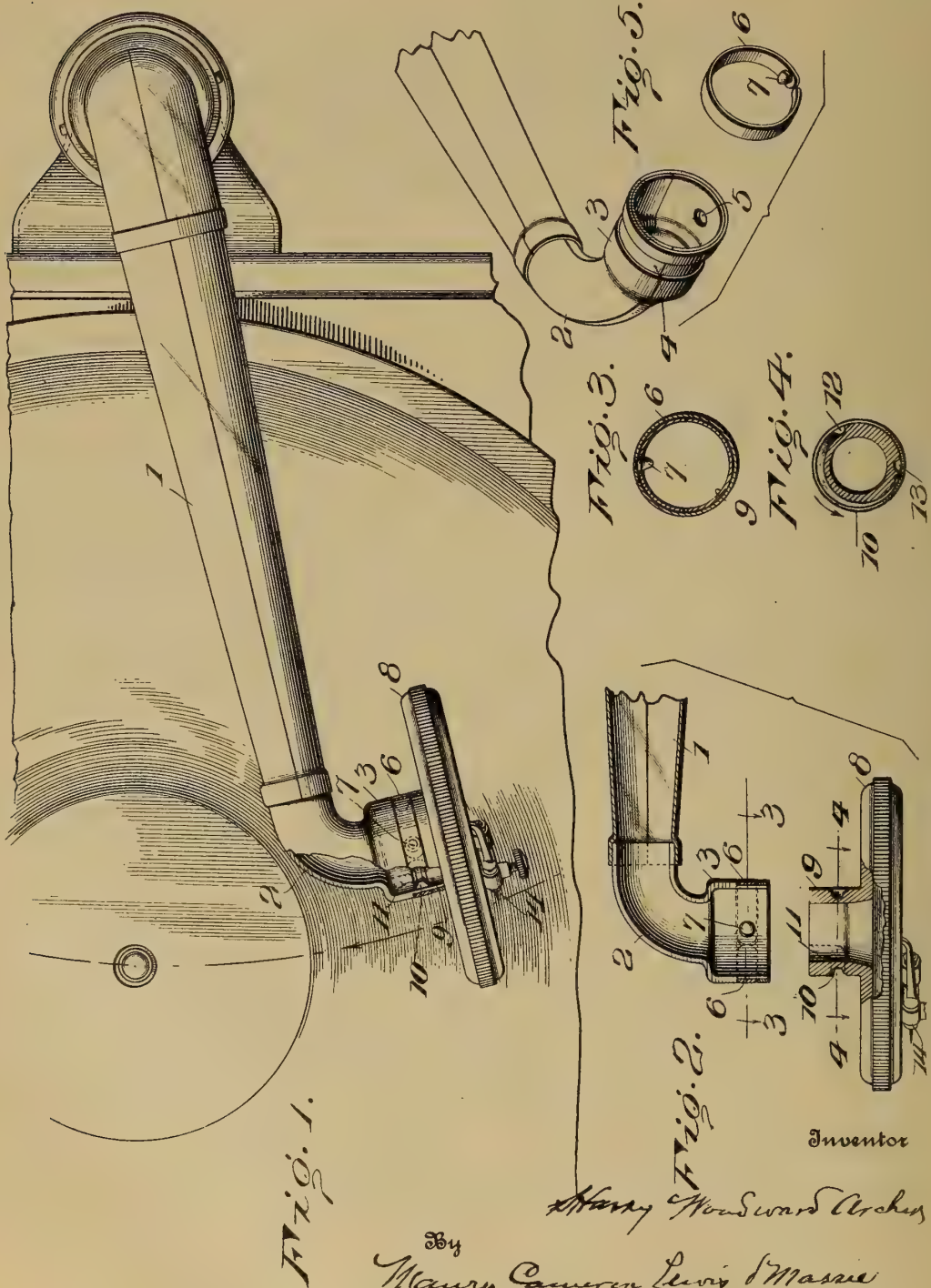
H. W. ARCHER.

MEANS FOR SECURING A SOUND BOX TO THE TONE ARM OF TALKING MACHINES.

APPLICATION FILED MAY 19, 1915.

1,212,309.

Patented Jan. 16, 1917.



Inventor

Harry Woodward Archer

By
Mauro Cameron Lewis & Massee

Attorney &

UNITED STATES PATENT OFFICE.

HARRY WOODWARD ARCHER, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

MEANS FOR SECURING A SOUND-BOX TO THE TONE-ARM OF TALKING-MACHINES.

1,212,309.

Specification of Letters Patent.

Patented Jan. 16, 1917.

Application filed May 19, 1915. Serial No. 29,161.

To all whom it may concern:

Be it known that I, HARRY WOODWARD ARCHER, a citizen of the United States of America, and a resident of Bridgeport, Connecticut, have invented a new and useful Improvement in Means for Securing a Sound-Box to the Tone-Arm of Talking-Machines, which invention is fully set forth in the following specification.

This invention relates to talking machines, and more particularly to the means for securing the sound-box thereof in proper relation with the tone-arm.

It has heretofore been proposed in talking machines to secure the sound-box to the neck of the tone-arm by providing a hub on the rear of the sound-box, which hub has a peripheral groove extending around the same and a groove extending longitudinally of the hub and registering with the peripheral groove, which peripheral groove has a conical depression formed in the bottom thereof in suitable position to permit a conical spring-pressed pin on the tone-arm to fit therein, so as to firmly hold the sound-box in operative position for reproduction, and at the same time the pin will yield sufficiently upon the application of power to permit the sound-box to be turned to the point where the spring-pressed pin registers with the longitudinal groove in the neck of the sound-box to permit the latter to be removed from the tone-arm. The spring controlling said pin has heretofore been located in a channel formed between an inner and an outer flange on the neck of the tone-arm. This form of construction is not only expensive to manufacture but has been found to be less efficient than is desirable in a properly constructed machine.

The object of the present invention is to reduce the cost of manufacture of the connection between the sound-box and the tone-arm, while at the same time increasing the efficiency of the connection and improving the neatness of appearance of the device as a whole.

With this object in view, the invention consists in the construction, arrangement and combination of parts hereinafter more fully described and then pointed out in the appended claims.

The inventive idea may be embodied in a variety of mechanical forms, one of which, for the purpose of illustrating the invention, is shown in the accompanying drawings, but such drawings are for the purpose of illustration only and not for defining the limits of the invention, reference being had to the appended claims for this purpose.

In said drawings:—Figure 1 is a broken detail plan view of a tone-arm and sound-box illustrating the invention; Fig. 2 is a detail view, partly in horizontal section, showing the neck of the tone-arm and the sound-box; Fig. 3 is a vertical section on the line 3—3 of Fig. 2; Fig. 4 is a vertical section on the line 4—4 of Fig. 2; and Fig. 5 is a perspective view of the neck of the tone-arm and the pin-bearing spring that coöperates therewith.

Referring to the drawings, in which like reference numerals indicate like parts throughout the several views, 1 indicates the tone-arm and 2 the neck thereof. Said neck at its outer sound-box receiving end is preferably flared or enlarged, as at 3, and formed on the exterior of said flared or enlarged portion 3 is an annular groove or depression 4, a hole or opening 5 being formed through the wall of said flared portion in the bottom of the groove. Fitting in said depression or groove 4 is a split spring ring 6, the thickness of the ring being such that, when the parts are in their normal operative position, the outer surface of the ring is approximately flush with the outer surface of the flared portion 3. This ring bears an inwardly extending projection, preferably shaped as a conically-formed inwardly-projecting pin 7 which, when the parts are in position, projects through the opening 5 in the neck of the tone-arm. The pin may be secured to the ring in any suitable manner, preferably by riveting. The sound-box 8, of any suitable form or construction, is provided with the usual rearwardly projecting hub 9 having a peripheral groove 10 formed therein and extending part way around said hub, with which the usual longitudinally extending groove 11 registers. Two slight conical depressions 12 and 13 are formed in the bottom of said groove, one at each end thereof. This is the

usual and well known form of bayonet-joint hub and groove heretofore commonly known in the art.

In operation, and referring to Fig. 2, the hub 9 of the sound-box 8 is inserted into the expanded neck 3 of the tone-arm and turned until the longitudinal groove 11 registers with the pin 7, and is then forced still farther inward until the rear end of the neck 9 on the sound-box reaches the bottom of the expanded portion 3, at which time the pin 7 is in registry with the groove 10. The sound-box may then be turned, with the pin 7 traveling in the groove 10, the turning movement being in either direction and continuing until the end of the groove 10 is reached, at which time the pin 7 is snapped by the spring 6 into the depression 12 or 13, as the case may be. In one of the depressions, the sound-box is held with the stylus 14 in proper position to engage the record. When the sound-box is turned so that the pin engages the other depression in the groove 10, the sound-box is in a position to hold the reproducing stylus out of operation with the record and facilitate the removal of the used stylus and the enplacement of a new stylus.

By the present invention, the superfluous and cumbersome-appearing outer flange of the construction heretofore employed is dispensed with and, by employing a split ring which embraces the neck of the tone-arm and yet fits snugly in a groove or depression formed therein, the spring is held securely in its operative position and yet is capable of being readily placed upon or removed from the tone-arm. It has been found that, by the use of the present invention, not only is the cost of construction diminished and the appearance of the machine improved, but that the device is more effective in operation and less liable to get out of order than the construction previously employed.

What is claimed is:—

1. In a talking machine, the combination of a tone-arm having an exterior peripheral groove in the end or neck-portion thereof, a spring resting in said groove with its outer surface substantially flush with the outer surface of said neck-portion, a projection on

said spring extending within the said neck-portion, and a sound-box having a hub extending within the said neck-portion and engaged and held in position by said projection.

2. In a talking machine, the combination of a tone-arm having an exterior annular groove in the end or neck-portion thereof, an annular split ring resting in said groove with its outer surface substantially flush with the outer surface of said neck-portion, a projection on said ring extending within the said neck-portion, and a sound-box having a hub extending within the said neck-portion and engaged and held in position by said projection.

3. In a talking machine, the combination of a tone-arm having an exterior annular groove in the end or neck-portion thereof, an annular split ring resting in said groove with its outer surface substantially flush with the outer surface of said neck-portion, a projection on said ring extending within the said neck-portion, and a sound-box having a hub extending within the said neck-portion and provided on its outer surface with a groove extending longitudinally thereof and registering with a second groove extending peripherally thereof, said peripheral groove being engaged by said projection when the parts are in operative position.

4. In a talking machine, the combination of a tone-arm having an exterior annular groove in the end or neck-portion thereof, a split spring ring resting in said groove with its outer surface substantially flush with the outer surface of said neck-portion, a pin rigidly secured to said spring ring and projecting through an opening in the bottom of said groove, and a sound-box having a hub extending within the said neck-portion and engaged and held in position by said pin.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

HARRY WOODWARD ARCHER.

Witnesses:

LESLIE S. EASTMAN,
JOHN S. GRIFFITH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

1,212,692

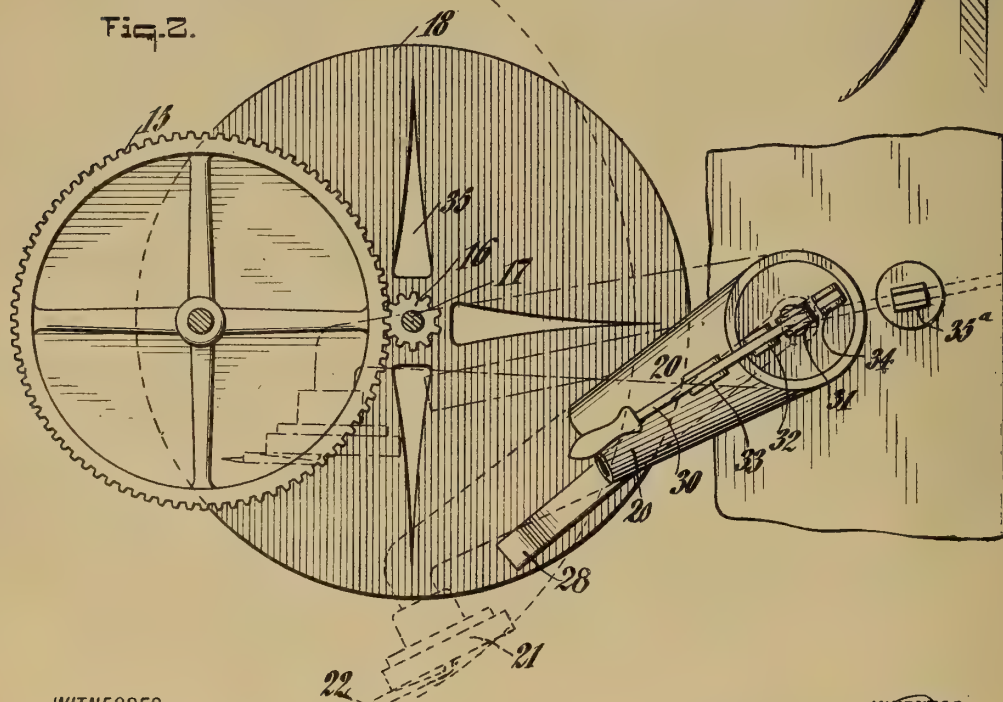
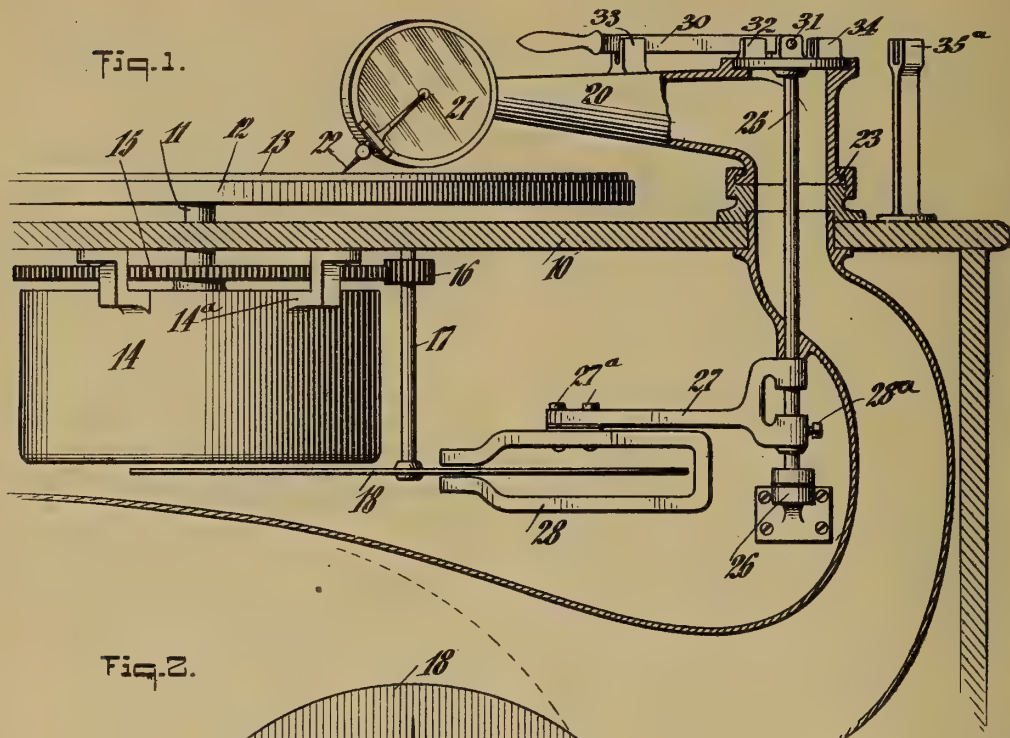
SPEED REGULATOR FOR PHONOGRAPHS.
#1,212,692-----A. Ruckgaber,
Patented-January 16th, 1917.
Filed-March 6th, 1914.

A. RUCKGABER.
SPEED REGULATOR FOR PHONOGRAPHS.
APPLICATION FILED MAR. 6, 1914.

1,212,692.

Patented Jan. 16, 1917.

4 SHEETS—SHEET 1.



WITNESSES
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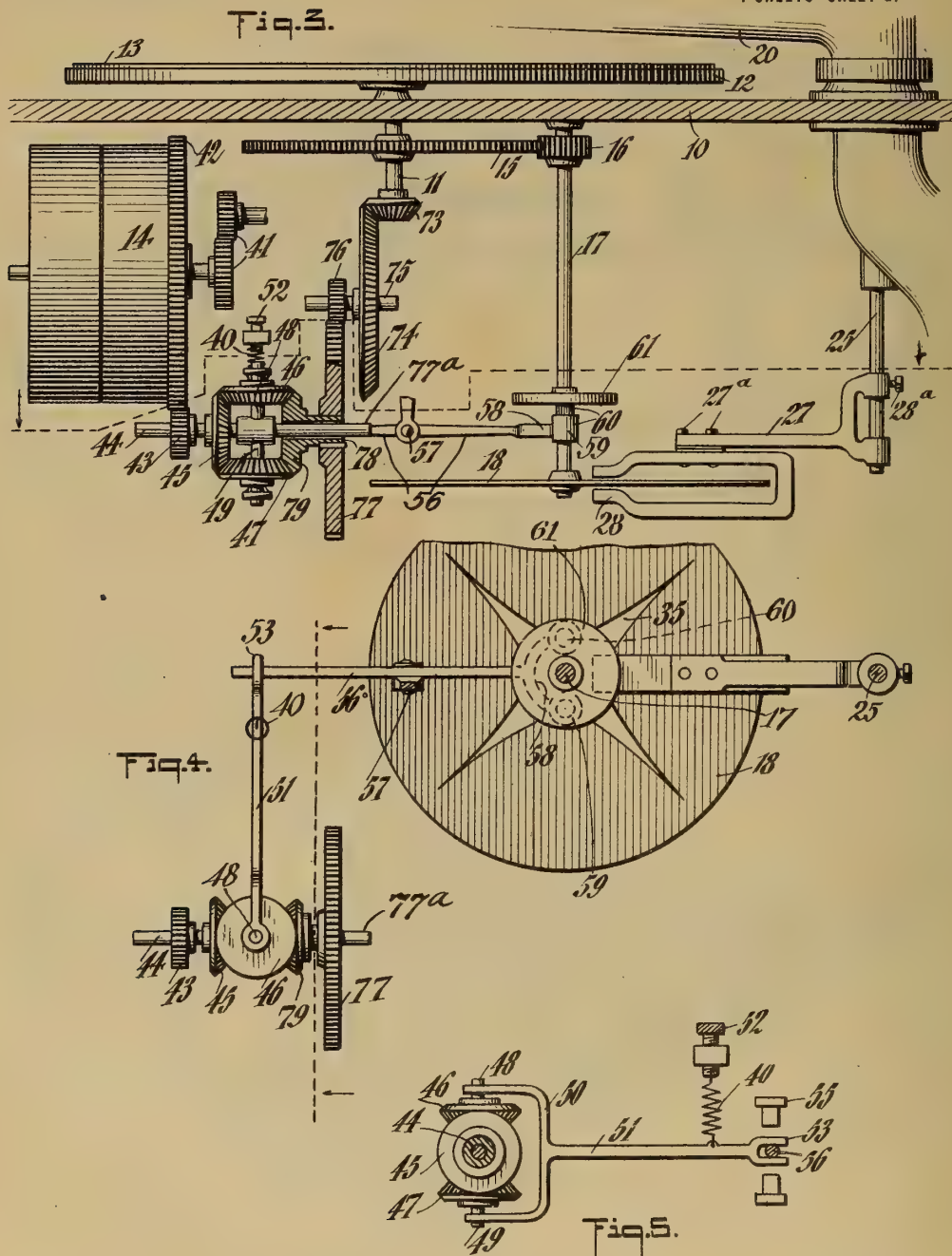


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SPEED REGULATOR FOR PHONOGRAPHS.
APPLICATION FILED MAR. 6, 1914.

1,212,692.

Patented Jan. 16, 1917.

4 SHEETS—SHEET 2.



WITNESSES
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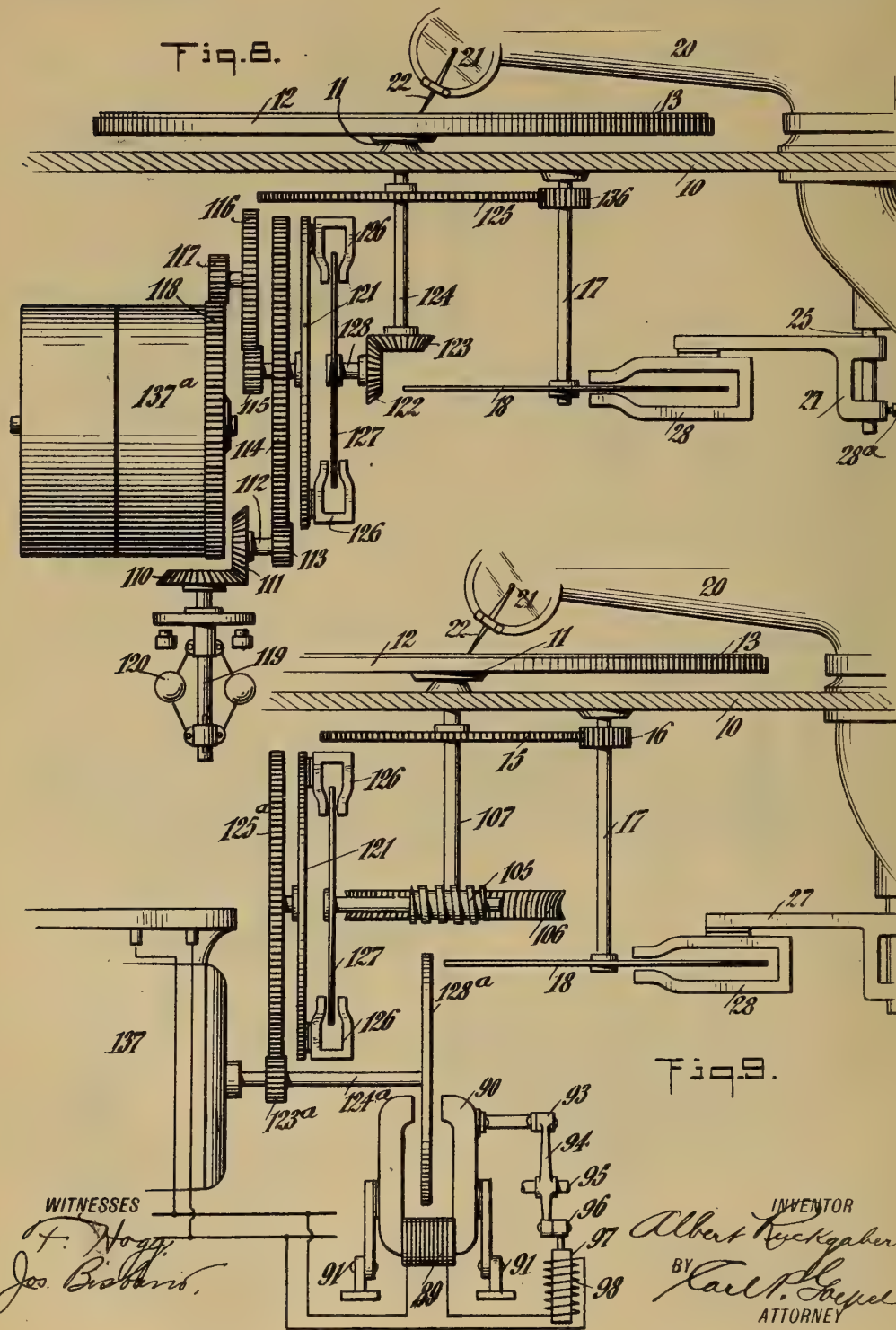


A. RUCKGABER.
SPEED REGULATOR FOR PHONOGRAPHS.
APPLICATION FILED MAR. 6, 1914.

1,212,692.

Patented Jan. 16, 1917.

4 SHEETS—SHEET 4.



UNITED STATES PATENT OFFICE.

ALBERT RUCKGABER, OF BROOKLYN, NEW YORK.

SPEED-REGULATOR FOR PHONOGRAPHS.

1,212,692.

Specification of Letters Patent.

Patented Jan. 16, 1917.

Application filed March 6, 1914. Serial No. 822,933.

To all whom it may concern:

Be it known that I, ALBERT RUCKGABER, a citizen of the United States, and a resident of Brooklyn, county of Kings, State of New York, have invented certain new and useful Improvements in Speed-Regulators for Phonographs, of which the following is a specification.

This invention relates to phonographs, and more particularly to improvements therein the object of which is to provide means for the regulation of the speed of the record-disk.

The invention will be more fully described hereinafter and finally pointed out in the claims.

In the accompanying drawings, Figure 1 is a side-view, partly in section, of the essential parts of the phonograph necessary for the carrying out of my invention, Fig. 2 is a plan-view, Fig. 3 is a vertical side-view, with parts in section, of another embodiment of my invention, Fig. 4 is a partial plan-view of the embodiment shown in Fig. 3, Fig. 5 is a side-view of a detail part used in the embodiment shown in Fig. 3. Fig. 6 is a side-view of another embodiment in which an electric motor is used for rotating the disk, and showing the electric connections, Fig. 7 is another embodiment of the parts used in connection with the electric motor, also showing the electric connections, Fig. 8 is a side-view of another embodiment in which a magnetic clutch is used, and Fig. 9 is a side-view of another embodiment using a magnetic clutch.

Similar characters of reference indicate corresponding parts throughout the various views.

Referring to the drawings, and more particularly to Fig. 1, the frame 10 supports the rotary shaft 11 having the record-support 12 thereon, on which is seated the record-disk 13. The support 12 and record-disk 13 are rotated in the manner well known by means of a spring, not shown, in the casing 14 supported by suitable brackets 14^a, and by the unwinding of the spring the shaft 11 is rotated. To the shaft 11 is secured a gear 15, which meshes with a pinion 16 on a shaft 17, to which shaft a metal disk 18 is secured. With the exception of this disk 18 and the operating parts thereof, the parts are well known and as used heretofore, and may be changed as occasion arises. The metal disk 18 is provided and suitably secured to the

shaft 17, in order to have the relative linear speed between the record-line and the stylus remain constant, or, otherwise stated, to have the angular speed increased or decreased according to whether the record commences at the periphery or near to the center of rotation. In order to have the stylus cooperate at the speed just stated, the swinging tone-arm 20, having its sound-producing member 21 at its free end and its stylus thereto secured, is movable at the bearing 23 as is well known, but has a shaft 25 supported in bearings 26 to which a support 27 is suitably secured by a thumb-screw or equivalent device indicated by 28^a. This bracket 27 supports the permanent magnet 28, which permanent magnet is regulated in its position by small thumb-screws 27^a. In order to lock the shaft 25 to the tone-arm 20, a locking-lever 30 is provided which is pivoted at 31, and engages the guide members 32 and 33, suitable other members 34 and 35^a being provided, into which the locking-member 30 is moved, in the event that the tone-arm is to be used in a manner different from that set forth heretofore, namely, in such a case where the record-disk is rotated, with a variable linear velocity of the record-line with respect to the stylus, and a constant angular velocity. By throwing the switch 30 into the members 34 and 35^a, the tone-arm 20 is free to rotate in the bearings 23, but the magnet 28 is gripped and hence it will be fixed in position in respect to the metal disk 18. But if the locking member 30 is thrown into action with the members 32 and 33, then the shaft 25 is locked there-to, and the magnet 28 is caused to move correspondingly with the tone-arm.

The spring in the casing 14 serves to rotate, through the intermediate mechanism described, the metal disk 18 and also the record-disk 13. As, however, it is desired to have a constant linear velocity of the record-line with respect to the stylus when using the disk for reproducing the selection, it is first necessary to fix the mechanism that the disk will revolve with the same velocity with which the original or master record was made. Thereafter the stylus is placed on the record-disk, either at its periphery and caused to follow the record-line inwardly, or it is placed at the interior portion of the record-disk and caused to follow the record-line outwardly, until near the periphery of the record-disk.

In order to maintain this desired velocity constant throughout the rendering of the piece to be played, it is necessary to provide a braking means, which will maintain the linear velocity of the record-line with respect to the stylus constant. For this purpose the magnet is caused to move correspondingly to the tone-arm 20, and as the magnet moves inwardly the drag on the disk is diminished and the angular velocity of the record is increased, in order to maintain the linear velocity of the record-line with respect to the stylus constant, assuming that the stylus moves inwardly. The metal disk is provided with openings of suitable configuration. These openings are shown in Fig. 2 and indicated by 35, and may be given any suitable configuration to be determined by experiment for the purpose of correcting the effects of varying friction, windage, etc. The object of these corrections is, that the speed of rotation of the record will give a constant linear velocity of the record-line with respect to the stylus for all positions of the stylus.

If the unwinding of the spring contained in the casing and used for the purpose of driving the record-disk, gives a constant torque, the movement of the magnet traveling over the disk toward the center will cause the drag to diminish, but as the driving torque is constant, by supposition, the angular velocity of the disk will increase, until the increased drag caused by the increased speed, multiplied by the distance the magnet is from the center of the disk, (or the magnet torque-arm) plus the friction torque, is equal to the driving torque moment of the spring. This follows because the drag on the disk rotating between the jaws of the permanent magnet is proportional to the strength of the magnet, the number of revolutions per minute of the disk, and to the magnet torque-arm. As the strength of the permanent magnet is a constant for any given case, the torque moment is therefore proportional to the product of the number of revolutions per minute by the torque-arm. Therefore the speed of revolution of the disk will increase in proportion to the amount the torque-arm of the magnet is shortened. As this spring does not give a constant torque, it is necessary to compensate for the change in order to have an effective constant torque. The counter-torque will have to be a variable one, and must be controlled independently of the speed. The magnitude of the counter-torque, exerted at any instant, should depend upon the torque of the spring at that time. It is therefore necessary to arrange a mechanical element which will measure this torque. Such a device is shown in Fig. 3, and is of the nature of a transmission dynamometer, and therefore the pressure exerted

by the end of the dynamometer-arm is proportional to the torque. This pressure is utilized to give a counter-torque or drag which will be independent of the speed. One way would be to employ a magnetic drag on the disk, but as this varies with the speed, the drag would not be independent of the speed. For this purpose the casing 14, containing the spring, is arranged to be wound up by means of the intermittent mechanism 41, as shown in Fig. 3, and is provided with a gear-wheel 42, which meshes with a pinion 43 on a shaft 44. To this shaft 44 is secured a bevel gear-wheel 45, which meshes with a gear-wheel 46 and another gear-wheel 47, both of which gear-wheels 46 and 47 are rotatable on shafts 48 and 49 suitably supported by a yoke 50 having an extension 51, to which the spring 40 is secured, and which spring 40 has its other end attached to an adjustable member 52, whereby the tension of the spring 40 may be regulated. The end 53 of the arm 51 is movable between members 55 to limit the movement thereof. The end 53 engages the rod 56, which is suitably pivoted at 57, and the free end of which is provided with a yoke 58, at the ends of which holders 59 are secured, to which friction members 60 are secured which are adapted to press against the friction-disk 61 secured to the shaft 17, on which shaft the metal disk 18, passing through the permanent magnet 28 supported on the member 27 of the shaft 25, is mounted. This shaft 25 passes through the tone-arm 20 and is rotated in accordance with the movement of the tone-arm. The shaft 17 is rotated by means of mechanism consisting of the pinion 16 meshing with the gear 15 secured to the record-disk shaft 11, which has a bevel gear 73 meshing with the bevel gear 74 on a shaft 75, to which shaft 75 a pinion 76 is secured, which meshes with the gear 77 on a shaft 77^a secured to a loose sleeve 78 having a bevel gear 79, which bevel gear 79 is rotated by means of the intermeshing with the gears 46 and 47. As the gear 42 is rotated, the pinion 43 and shaft 44 are rotated in correspondence therewith and transmit their motion through the intermediate gears 46 and 47 to the gear 79, gear 77, pinion 76, gear 74, gear 73, shaft 11, gear and pinion 15 and 16, and to the shaft 17, and thereby move the metal disk 18.

The connection of the dynamometer in the above described manner causes the torque of the spring to produce a counter-torque by means of the friction-disks. This counter-torque depends upon the pressure and is independent of the speed. The pressure of the spring 40 is regulated by means of the adjustable member 52, so that any driving torque above the desired torque will overcome the action of the spring 40 and produce a substantially equal counter-fric-

tional torque. The equilibrium will be attained when the driving torque is exactly equal to the sums of the magnetic torque, the counter-frictional torque caused by the dynamometer, and the frictional torque caused by the friction of the parts. These frictional torques are practically independent of the speed. The magnetic drag or torque is a constant, as has been set forth. Hence there is always a constant effective torque, since the torque moment of the spring minus the counter-frictional torque caused by the dynamometer, which difference is the effective torque, is equal to the sum of the magnetic drag or torque and the torque of the friction in the bearings and of the air, as set forth. Since the magnetic drag or torque is a constant and since the friction caused by the bearings and the air is practically a constant, the effective torque will also remain a constant.

As the effective torque is constant, the effect of the movement of the magnet 28 toward the center of the disk 18 is to permit the increase of the speed of revolution of the disk 18 in inverse proportion to the distance of the magnet 28 from the center of the disk 18, if the disk is solid. However, to produce the desired variation in the angular velocity, and to secure the desired constant linear velocity, cuts 35 are made in the metal disk 18 so as to remove some of the material and to reduce the drag. The disk 18 may be of magnetic or non-magnetic material.

If it is desired to use an electric motor instead of a spring, the arrangement shown in Figs. 6, 7, and 9 may be installed. Heretofore the difficulty of using an electric motor to operate a phonograph resided apparently in the variation of speed with the voltage changes. Thus, a change from 100 to 105 volts, or 5%, would mean an increase of speed of the same amount, whether the motor is shunt or series wound. This will, of course, be very noticeable in the pitch of the sound of phonographs. In order to counteract this change in the voltage, it is proposed to use a series motor, and to use in the place of the present ball-governor, a metal disk revolving between the poles of a permanent magnet to act as a load, which has been heretofore described. This magnet, in this particular case, would be fixed in relation to the disk by trial or experiment. If the voltage remains constant, the conditions are uniform and the motor will run at the proper speed. If, however, the voltage should change, the speed will increase in proportion, and for this reason the disk is used with the permanent magnet, together with another compensating magnet, either permanent or electric, to increase or decrease the load on the motor sufficiently to restore, or rather maintain, the uniform speed. In order to increase or decrease the load, it

will not be sufficient to simply use a compensating electromagnet, fixed in position, as the change of voltage, while increasing the drag in proportion to the square of the change of voltage, will not sufficiently load or unload the motor to maintain the original speed. It is therefore necessary, in order to increase or decrease the drag sufficiently, to vary the position of the compensating magnet with reference to the disk. For this purpose the electromagnet is provided, which is shown clearly in Fig. 6, and indicated by 90. This electromagnet 90 is pivoted and movable on the bearing 91, and has an arm 92 extending therefrom suitably secured to an arm 93, which is pivotally connected with the bell-crank lever 94 pivoted at 95, and having its free end 96 secured to the core of a solenoid 98. Thus, as the voltage increases, the current in the solenoid will be increased in proportion, which increase will move the core 97 slightly, and hence move the magnet 90 on its bearing 91 in respect to the metal disk 18. The electromagnet is thus moved toward or away from the center of the disk 18 by means of the core 97 and the solenoid 98, while the proper reverse movement is supplied by the spring 100, and in this manner the increase or decrease of the voltage is counterbalanced by a corresponding increase or decrease in the drag of electromagnet 90. It is desirable to have a permanent magnet 28 to act as a constant brake upon the metal disk 18, so that if the current, through the coils 89 of the electromagnet 90, suddenly ceases, the mechanism will not attain a dangerous speed. This permanent magnet 28, however, merely acts as a safety-brake, and its effect should not be made large. The metal disk 18 is secured to the shaft 17 having the pinion 16 and meshing with the gear 15, and the table 12 with its record-disk 13 and shaft 11, are arranged in a manner similar to that shown in Fig. 1. The motor-shaft 101 of the motor 137 has a pinion 102 meshing with a gear 103 to which is secured a shaft 104 having a worm 105 secured thereto, meshing with a worm-gear 106; the shaft 107 is secured to the gear 15. The permanent magnet is shown in Fig. 6, and indicated by 28.

In Fig. 7 is shown the electric motor applied to a machine for giving a constant linear velocity of the record-line with respect to the stylus and this again has a permanent magnet 28 for the safety load, and has the magnet 90 with an energizing-coil 89 connected with the main line, and has the bearing 91 of the magnet 90 suitably supported by the movable bracket-support 27 secured by the screw 28^a to the shaft 25, which rotates correspondingly with the tone-arm 20, having the sound-producing mechanism 21 and the stylus 22. The electromagnet 90

is moved by means of the core 97 moving within the solenoid 98, the core being pivoted at 95 and is connected with the link 93, the movement of the magnet being restrained by the stop 101 and the reverse movement being produced by the spring 100.

In Fig. 8 is shown another embodiment of my invention which uses a magnetic clutch. The spring motor 137^a rotates the gear 118 which meshes with a pinion 117, thus causing the gear 116 to rotate, and actuate the pinion 115, which is on the same shaft as the gear 114, and also the disk 121 carrying the two permanent magnets 126 having between their poles a metal disk 127, which may be made of a magnetic or non-magnetic material. The rotation of the magnets 126 causes the disk 127 to rotate with them at a lower speed, depending upon the load upon the mechanism. The disk 127 turns the bevel gear 122 by means of their common shaft 128. The bevel gear 122 meshes with the bevel gear 123 upon the shaft 124, which is connected with the shaft 11 of the turntable 12 upon which the record-disk 13 is mounted, as before set forth. Upon the shaft 124 is the gear 125 that meshes with the pinion 136 which is upon the shaft 17. This shaft also carries the disk 18 revolving between the poles of the permanent magnet 28. By means of these connections, the rotation of the disk 127 by the motor 137^a causes the rotation of the disk 18 between the poles of the magnet 28, which produces a drag or load upon the mechanism that determines the speed of rotation of the disk 127. The gear 114 meshes with the pinion 113 upon the shaft 112 that carries the bevel gear 111 meshing with the bevel gear 110 upon the shaft 119. This shaft has the ball-governor 120, so that a constant speed of rotation of the motor-shaft, hence of the magnets 126, is maintained. The permanent magnet 28 is connected to the tone-arm, as has been set forth.

In Fig. 9 another embodiment of my invention is shown, in which the series electric motor 137 rotates the shaft 124^a. On this shaft is the pinion 123^a meshing with the gear 125^a, which rotates the disk 121 on which are mounted the magnets 126, which form a magnetic clutch with the disk 127, as has been set forth. The disk 127 actuates the worm 105, which meshes with the corresponding worm-gear 106 on the shaft 107 and rotates the turntable 12 and the record-disk 13, as has been set forth. On the shaft 107 is mounted the gear 15 which meshes with the pinion 16 mounted upon the shaft 17. On this shaft 17 is mounted the disk 18 revolving between the poles of the permanent magnet 28, which is secured to the tone-arm by means of the bracket 27, as has already been set forth. On the shaft 124^a is also mounted the disk 128^a revolving

between the poles of the electro-magnet 90 energized by the coil 89 and pivoted in bearings 91. This electro-magnet 90 is caused to swing by the movement of the core 97 in the solenoid coil 98, which is connected to the electromagnet 90 by means of the lever 96 connected to the lever 94 pivoted at 95 and attached to the lever 93. The reverse movement of the electromagnet 90 is supplied by a spring, as has already been set forth, and shown for instance, by the reference character 100 in Fig. 7. The electro-magnet 90 is thus moved toward or away from the center of the disk 128^a as the voltage is increased or decreased, thus counteracting the effect of the increased or decreased voltage, in increasing or decreasing the speed of rotation.

I have described several embodiments of my invention, but changes may be made therein without departing from the spirit of the invention as defined in the appended claims.

I claim:

1. In a phonograph having a record-disk, a movable tone-arm, means for moving the record-disk, a rotary member rotated with the record-disk, and means movable by the tone-arm, the last-named means and rotary member being movable in respect to each other, and being in magnetic relation with respect to each other, for the purpose of regulating the speed of the record-disk.

2. In a phonograph having a record-disk, means for moving the same, a tone-arm, a rotary member rotatable with the record-disk, and a magnetic member movable by the tone-arm in respect to the rotary member, thereby causing a braking action on the rotary member.

3. In a phonograph, the combination of a record disk, means for moving the same, and a stylus relatively movable to said record disk, with a member movable with said record disk, and a magnetic member coacting with said first-named member and in magnetic relationship therewith, one of said members being movable in respect to the other, the action of said magnetic member upon said first named member being automatically changed to correspond with, and to compensate for, any tendency to change the relative linear velocity of the record line to the stylus from a predetermined relative linear velocity of the record line to the stylus, so as to obtain a predetermined linear velocity of the record line in respect to the stylus at any position of the stylus in respect to the record line.

4. In a phonograph having a stylus, a record-disk, and means for moving the same, a rotatable metallic member rotating with the record-disk, and a magnetic member, movable in respect to the metallic member, and means for causing the movement

of the magnetic member in respect to the metallic member to correspond to the movement of the stylus in respect to the record-disk.

5 5. In a phonograph having a stylus, a record-disk, and means for moving the same, a metal braking disk moved by said means, a magnetic braking member coöperating with said metal disk, a support for the stylus, a support for the magnetic braking member, and a connecting member for the stylus and braking-member supports.

6. In a phonograph having a stylus, a record-disk, and means for moving the same, 15 a metal braking disk moved by said means having a cut-out portion, a magnetic braking member coöperating with said metal disk and with said cut-out portion, and means connecting the stylus with the braking member for causing the movement of the braking member in respect to the metal disk to correspond with the movement of the stylus in respect to the record-disk.

7. In a phonograph having a stylus, a record disk, and means for moving the record disk, transmission means between said means and the record disk, a magnetic clutch interposed within said transmission means, 25 a metal disk movable by said transmission means, a magnetic braking member coöperating with said metal disk; and means connecting the stylus with the magnetic braking member for causing the movement of the said braking member with respect to the metal disk to correspond with the movement of the stylus with respect to the record disk.

8. In a phonograph having a stylus, a record-disk, and a series electric motor, transmission means between the electric motor and the record-disk, a magnetic clutch interposed within said transmission means, a metal disk movable by said transmission means, a magnetic braking member coöperating with said metal disk, and means connecting the stylus with the magnetic braking member for causing the movement of the braking member in respect to the metal disk to correspond with the movement of the stylus in respect to the record-disk.

9. In a phonograph having a stylus, a record-disk, and a series electric motor, transmission means between the electric mo-

tor and the record-disk, including a magnetic clutch, a metal disk movable by said transmission means, a magnetic braking member coöperating with said metal disk, means connecting the stylus with the magnetic braking member for causing the movement of the braking member in respect to the metal disk to correspond with the movement of the stylus in respect to the record-disk, and means for varying the load on the motor in order to maintain the desired velocity of the record-disk independent of any fluctuation in the voltage of the supply-circuit to the motor.

10. In a phonograph having a record disk, a reproducing member movable relatively to the record disk, means for moving the record disk, a rotary member rotated with the record disk, and magnetic means movable in respect to said rotary member, and during its movement in magnetic relationship with said rotary member, the movement of the magnetic member relatively to the rotary member corresponding with the movement of the reproducing member relatively to the record disk.

11. In a phonograph having a record disk, a stylus coacting therewith, a rotary member, and means movable by the stylus and movable in respect to the rotary member, and in magnetic relationship therewith.

12. In a phonograph, the combination of a record medium, a medium coacting therewith, and members magnetically coacting with each other, with means for changing the position of one of said magnetically coacting members relatively to the other, upon the change of position of the said coacting medium on the record medium, and means whereby a change of the relative linear velocity of the record medium and coacting medium at the coacting point is produced, on the change of position of one of the magnetically coacting members relatively to the other.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

ALBERT RUCKGABER.

Witnesses:

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JOS. BISBAND.

SPEED REGULATOR FOR PHONOGRAPHS,
#1,212,693-----A. Ruckgaber,
Patented-January 16th, 1917.
Filed-August 7th, 1914.

1,212,693.

2 SHEETS—SHEET 1.

Fig. 1.

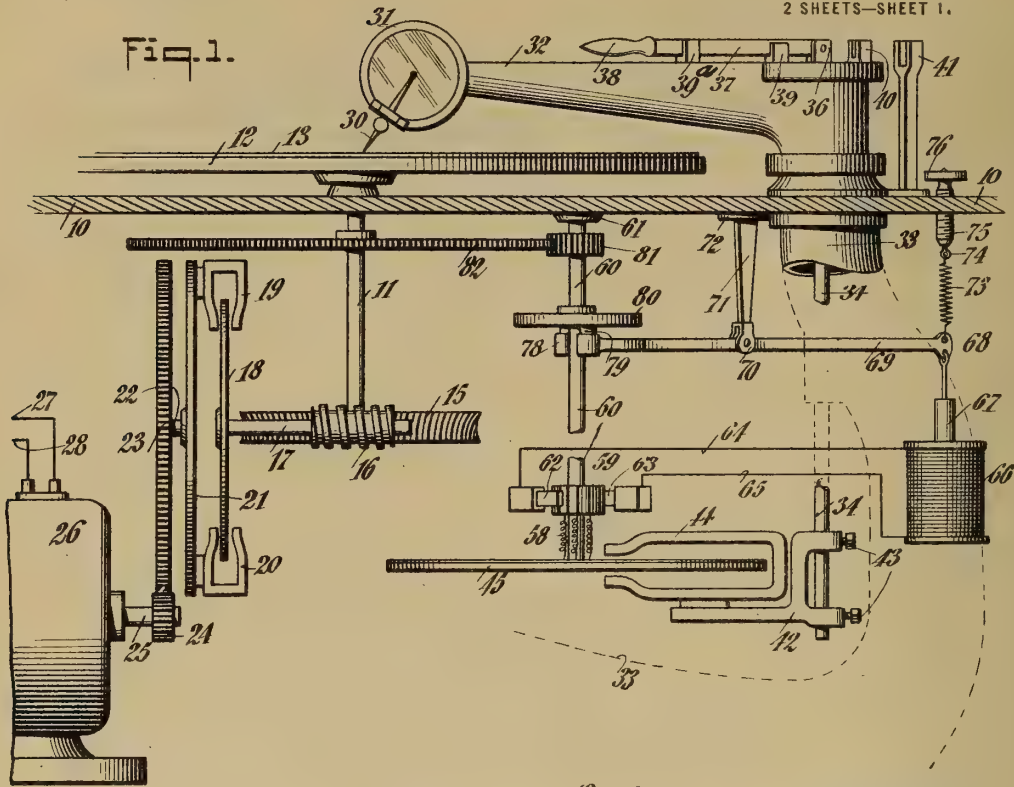
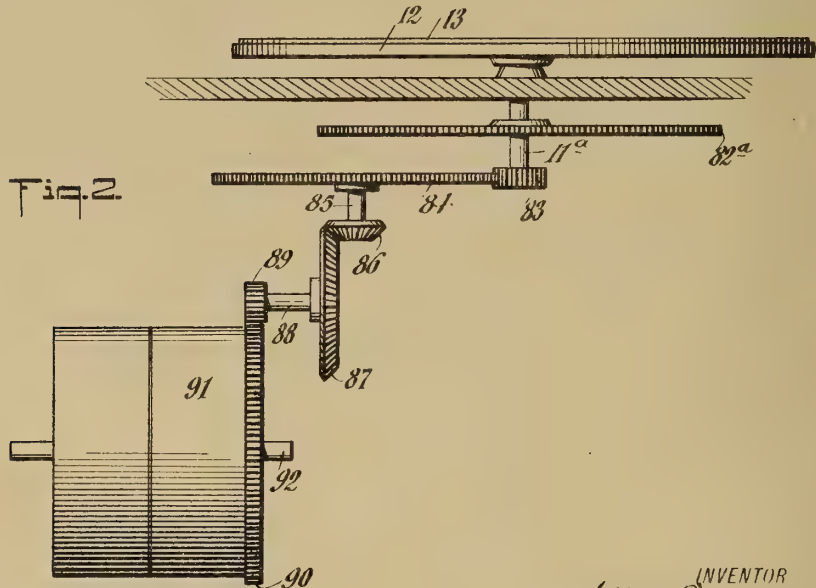


Fig. 2.



WITNESSES

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INVENTOR

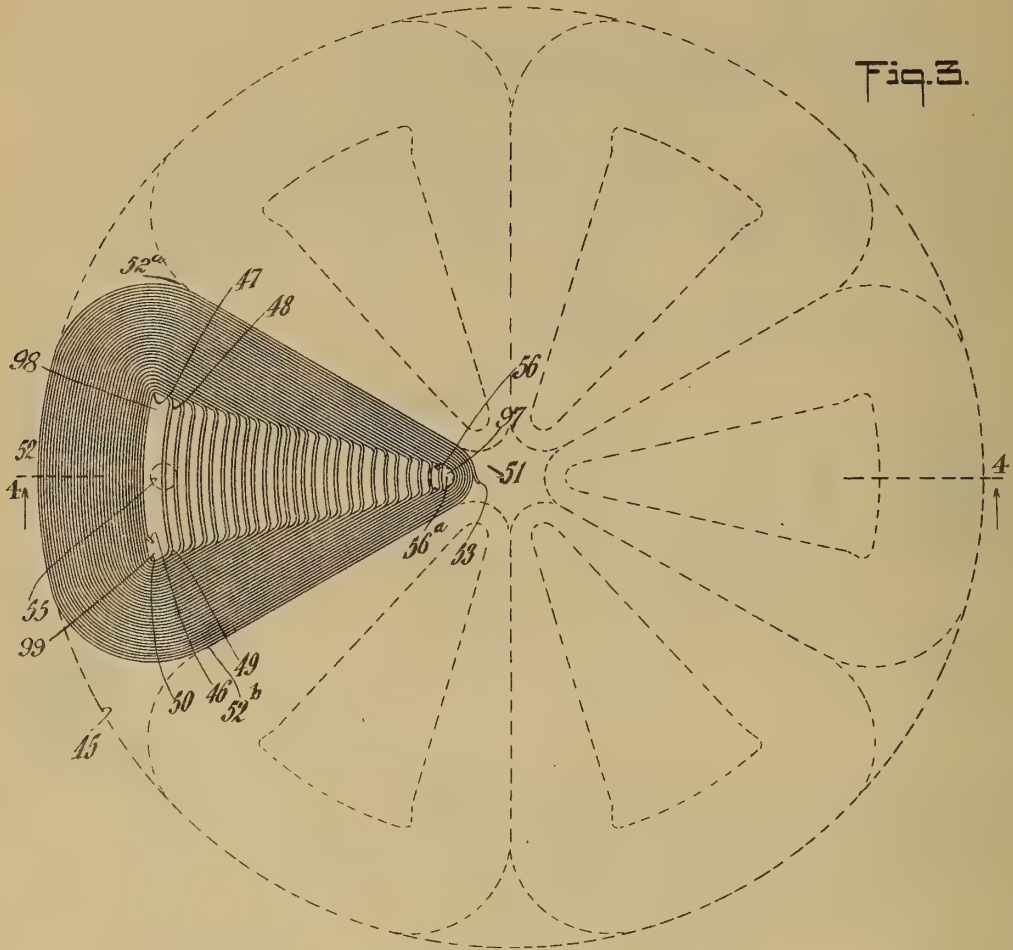
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A. RUCKGABER.
SPEED REGULATOR FOR PHONOGRAPHS.
APPLICATION FILED AUG. 7, 1914.

1,212,693.

Patented Jan. 16, 1917.
2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

ALBERT RUCKGABER, OF BROOKLYN, NEW YORK.

SPEED-REGULATOR FOR PHONOGRAPHS.

1,212,693.

Specification of Letters Patent. Patented Jan. 16, 1917.

Application filed August 7, 1914. Serial No. 855,618.

To all whom it may concern:

Be it known that I, ALBERT RUCKGABER, a citizen of the United States, and a resident of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Speed-Regulators for Phonographs, of which the following is a specification.

This invention relates to phonographs, and more particularly to improvements therein, and to the invention described in my copending application filed by me on March 6, 1914, under Serial No. 822,933.

The invention of the present application has particularly for its object to utilize the currents generated by the rotation of coils of wire passing between the jaws of a permanent magnet so as to create friction, and thereby regulate the speed of the record disk.

The invention will be more fully described hereinafter and finally pointed out in the claims.

In the accompanying drawings, Figure 1 is a side view, partly in section, of the essential parts of the phonograph necessary for the carrying out of my invention, and showing the invention applied thereto, the operating parts being driven by an electric motor, Fig. 2 is a side view partly in section of the operating parts driven by a spring motor, Fig. 3 is a plan view of the disk showing the method of winding the coils thereon, and Fig. 4 is a vertical transverse section taken on line 4—4 of Fig. 3.

Similar reference numerals indicate corresponding parts throughout the various views.

Referring to the drawings, and more particularly to Fig. 1, the frame 10 of the machine supports the rotary shaft 11 having the record support 12 thereon, on which is seated the record disk 13. The support 12 and record disk 13 are rotated by means of the gear wheel 15 secured to the shaft 11 which gear wheel 15 meshes with the worm 16 secured to the shaft 17, which in turn is secured to the metal disk 18. The metal disk 18 is rotated by means of the attraction afforded by the magnets 19 and 20, which are supported by the rotary member 21 and embrace the peripheral portions of the member 18. This support 21 is secured to the shaft 22 which in turn is secured to the gear wheel 23, which meshes with a pinion 24 on the shaft 25 of the electric

motor 26. The electric motor has conductors 27 and 28, serving to supply the motor 26 with electric current, whereby the shaft 25 is rotated and sets into operation the train just described. The stylus 30 is supported as usual by the sound-producing member 31 on the tone arm 32, which extends downwardly through the base 10 into the horn portion 33 shown in dotted lines in Fig. 1. Passing through the tone arm is arranged a shaft 34 which has its upper end 36 pivotally secured to the locking member 37 which is provided with the handle 38, and which, in the position shown in Fig. 1, rests on supports 39 and 39^a. When the locking member 37 is in the position shown in Fig. 1, it moves with the tone arm 32, and consequently the shaft 34 is moved correspondingly. When, however, the locking member is moved so as to be engaged by the support 40, and by the stationary support 41 on the base 10, then the shaft 34 is locked in position and prevented from moving with the tone arm. Secured to the shaft 34 is a support 42 which is secured thereto by the locking members 43, and which support 42 has a permanent magnet 44 thereon. When the locking member 37 is engaged by the supports 39 and 39^a, the magnet 44 moves with the tone-arm 32, but when the locking member 37 is engaged by the supports 40 and 41, then the magnet 44 is stationary. This magnet 44 is movable in respect to a disk 45 as the vertical shaft 34 is moved during the movement of the tone arm 32, when as stated the locking member 37 is engaged by the supports 39 and 39^a. The disk 45 is provided with a plurality of coils wound in the special manner shown in Fig. 3, six coils being shown on the disk 45. Each of these coils is wound in the manner shown in full lines at the left of Fig. 3, in which the end 46 of the coil which is a beginning of the coil, extends in the direction 46, 47, where the wire is bent and then extends parallel to the radius 51—52^a of the disk a short distance to the point 48 where it is again bent, and carried in a circular direction to the point 49, where it is again bent, and then extends parallel to the radius 51—52^b outwardly to the point 50, where it is again bent and caused to be placed in a position adjacent to and substantially concentric with that part of the coil between the points 46 and 47. Thereafter, it is again bent at a point adjacent the point 47, and is carried

parallel to the radius 51—52^a inwardly adjacent to and parallel with the portion of the first convolution between 47 and 48, and thereafter it follows the outline of the first
 5 convolution 46, 47, 48, 49 and 50. It will be noted that the outermost lateral wires of the coil extend in a radial direction, and the wires adjacent to them run parallel to each other and to the outermost wires, while
 10 those two circular portions that extend substantially at right angles to the radial line 51, 52, are also concentric with each other, until the coil has its other end 53 in close proximity to the center of the disk. The extreme positions of the points of the permanent magnet are shown in dotted lines and are indicated by the characters 55 and 56. The ends of each of the coils arranged on the disk 45 are connected by the connecting
 20 wires 58 with commutator bars of the commutator 59 shown in Fig. 1. This commutator is arranged on the shaft 60 secured to the disk 45 and extending upwardly to a bearing 61 in the base 10. Brushes 62 and
 25 63 and connecting wires 64 and 65 serve to take off the current produced by the movement of the coils past the magnet terminals, and cause the same to flow through the coil 66 surrounding the core 67 and having a solenoid action therewith. The core 67 is hingedly connected with one end 68 of a lever 69, which is hinged at 70 to a supporting bar 71, which is secured at 72 to the base 10. This end 68 has also hingedly connected
 35 therewith a spring 73 which is connected at 74 with a screw 75 which enables the spring 73 to be adjusted depending upon the rotation of the screw 75. For convenience, the screw 75 is provided with a manipulating knob 76. The other end 78 of the lever 69 supports pads 79 of leather or other material, which press against the rotating friction disk 80 which is secured to the shaft 60, whereby a varying friction can
 45 be obtained. Thus, by the downward movement of the end 78 away from the disk 80, less friction is obtained than when the end 78 is moved toward the disk 80, and pressed thereagainst. To the shaft 60 is secured a pinion 81 which meshes with the gear 82 secured to the shaft 11.

In Fig. 2, the train for operating the disk support 12 and record disk 13 is shown, and in this the electric motor shown in Fig. 1
 55 is replaced by the usual spring motor. For this purpose, the shaft 11^a has secured thereto a gear 82^a, and a pinion 83, which meshes with a gear 84, which has secured thereto a shaft 85 having the bevel gear 86 meshing
 60 with the bevel gear 87 which is secured to the shaft 88. To the shaft 88 a pinion 89 is secured, meshing with the gear 90 which is secured to the casing 91 which surrounds a spring, and which has a shaft 92. Thus, by
 65 the operation of this train by the gradual

unwinding of the spring which is not shown but which is contained in the casing 91, the support 12 with the record disk 13 thereon is operated.

It will thus be seen that in the embodiment shown in the drawings and described, a disk carrying coils of wires revolves between the jaws of the permanent magnet which is mounted similarly to previous embodiments in my copending application, and
 75 moving in conjunction with the tone-arm.

In variable speed phonographs, the linear velocity of the record line with respect to the stylus is constant, and in the arrangement herein described, each portion of the
 80 disk with the coils, as it passes between the jaws of the magnet, has an equivalent constant linear velocity. In the case of the structure shown in the copending application referred to, the disk is composed of metal, having cut-out portions. But for the purpose of explaining the present invention, it is assumed that the disk is solid, that is, without cut-out portions. On this assumption, then, the magnitude of the eddy currents generated in its structure by the rotation of the disk between the jaws of the magnet, is constant. This is because the electromotive force generated in the disk and causing these currents to flow, depends
 95 on the strength of the magnetic field, and upon the length of the portion of the disk between the jaws of the magnet, and upon the linear velocity with which the portion of the disk between the jaws of the magnet cuts the lines of force, and as these are constant, as also the resistance of the disk is constant, the eddy currents flowing in the disk are constant, for all positions of the magnet. These currents flow radially and could be taken off through contacts located at the center and at the periphery. While the currents generated under these conditions may be of some magnitude, the electromotive force will be small, and difficulty will be experienced in constructing the contacts to give a low resistance. In the structure herein described, however, coils of wire are utilized in order to provide a higher electromotive force than can be obtained from the metal disk. In this case, we again have a constant strength of magnetic field, a constant length of each wire under the magnetic pole at one time, a constant resistance of each coil and of the solenoid, and therefore the current flowing will be a constant, provided a constant linear velocity of each portion of the coil as it passes between the jaws of the magnet is maintained. Conversely, if the current taken from the windings of the coil is maintained constant, a constant linear velocity of each portion of the coil as it passes between the jaws of the magnet will be maintained, and therefore a constant linear velocity of
 130

each portion of the record line as it passes underneath the stylus, will be maintained.

In order to maintain the current taken from the coil at a constant value, the current is conducted to a solenoid which operates on an iron core, and acting through a lever, presses the friction pads against a friction disk, the spring 73 resisting the pull of the solenoid with a practically constant tension. Should the speed be too high, the current will exceed the average value, and the friction pad 79 will be pressed against the friction disk 80, whereby the speed will be lowered and consequently the value of the current taken from the commutator 59 and flowing through the solenoid 66 is in turn reduced, which in turn will reduce the friction on the friction disk. Should the speed be too low, the current passing through the solenoid 66 will be reduced, and consequently the core 67 will be drawn up slightly by the spring 73, which will pull up the lever 69, and the drag on the friction disk by the end 78 will be reduced, thus allowing the speed to increase to the proper amount. For this reason it is advantageous that the friction pad 78 should normally bear against the friction disk 80, allowing the solenoid to increase or decrease the friction in accordance with the requirements.

The adjustment of the spring 73 will control the constant linear velocity which will be maintained throughout the playing of the record, and can be adjusted similarly to the arrangement in the machine heretofore used.

The machine described is suitable for playing constant speed records by simply fixing the position of the magnet at the proper point to give the proper constant speed.

In order to clearly appreciate the difference between the present invention and the constant speed phonographs, it must be remembered that in the case of the present constant speed phonographs with a ball governor, the arrangement of the springs and weights on the governor is such that they maintain a constant angular velocity by varying the drag on the system or by increasing or decreasing the friction in the system. The arrangement of weights and springs in the governor is essentially adapted only for a constant speed, and any attempt to regulate the speed by having the tone arm vary the point in space where friction takes place between the friction disk and the friction pad, to obtain the desired variable rotative speed of the record table, as in a prior patent to Mr. Taintor, No. 730,986, will lead to unsatisfactory results on account of the unsatisfactory control it is possible to exert over friction.

Whereas in the case of the present con-

stant speed phonograph, the angular velocity with which the record disk revolves is a constant and therefore supplies us with a convenient and simple means of controlling the speed by aid of the ball governor, in the case of the variable speed phonograph, however, the angular velocity is continuously varying and although the need of some simple device for measuring and controlling the variable speed is felt, yet there seems to be great difficulty in devising a purely mechanical device to achieve this result. In the case of the present invention, I utilize the principle of the generation of an electromotive force in a moving conductor, cutting the lines of force of a magnetic field, the magnitude of such an electromotive force being proportional among other things, to the linear velocity with which the lines of force are cut. Hence this principle as embodied in the present arrangement, furnishes us with the required device for measuring and at the same time controlling the speed in the manner described elsewhere in this specification.

The action of the winding shown in Fig. 3 is as follows: In the case of that part of the coil running in a radial direction, the electromotive force generated in it when cutting the lines of force emanating from the magnet, will be proportional to the distance of the magnet from the center, if the angular velocity of the coil is constant. If, however, the coil revolves so that each portion of the same as it passes between the jaws of the magnet, cuts the lines of force with a constant linear velocity, then the electromotive force generated in the conductor will be a constant. A plurality or multiplicity of parts so arranged will give an electromotive force proportionately greater if connected in series. As shown in Fig. 3, only the outermost lateral wires of the coil run truly radial, and the adjacent wires run parallel to the outermost wires and to each other, which is done in order to have the same number of wires under the magnet at one instant, irrespective of the location of the magnet. In order to avoid generating opposing electromotive forces in the two legs of the coil at the same instant when the magnet is in one of the extreme positions 56, Fig. 3, a space 56^a is left, which becomes proportionately greater as the magnet is nearer the periphery of the coil. During the time that the magnet is in the space 97, 98 and 99, no electromotive force is generated.

In the embodiment shown in Fig. 3, when the magnet is in one extreme position, near the center, as indicated by 56, the least number of turns of each coil cut the lines of force of the magnet, and when it is in the other extreme position, namely near the periphery, as indicated by 55, the largest num-

ber of turns of each coil cut the lines of force. Any intermediate position of the magnet has a different number of conductors of each coil cut the lines of force of the magnet. If, however, each coil should be wound as to have the same number of turns cut the lines of force of the magnet irrespective of the position of the magnet, then the maximum value of the electromotive force and the duration of each pulsation would be the same for all positions of the magnet as it moved inward from position 55 to 56, but the time interval between these pulsations would become proportionately less as the magnet moved inward. The flow of energy to the solenoid on account of the increased number of pulsations in a given unit of time would, therefore, increase as the magnet moves inward. But in order to make the proper correction, more conductors are provided near the periphery than near the center and return from one side of the coil to the other side, as in the case of the coil shown in Fig. 3. By this means, the pull of the solenoid acting on its core, will practically remain constant if the linear velocity of each portion of the coil as it passes the jaws of the magnet is constant. It will be noted that throughout the coil, the portions of the turns passing from one lateral part of the coil to the other, between the extreme positions of the magnet, are curved or circularly arranged, so as not to produce any electromotive force in those parts by the rotation of the coil.

The winding as shown in Fig. 3 can undoubtedly be changed to meet certain conditions, as for instance, in order to provide a continuous flow of energy to the solenoid.

In the embodiment shown in the drawings, the use of a solenoid operated by the electric current produced by the cutting of the lines of force of the magnet by the coil or coils has been shown and this has been described herein, but other means may be substituted therefor which work in a way to accomplish the same result, and which may suggest themselves to one skilled in the art.

The electric motor 26, shown in Fig. 1, can be either shunt or series wound. In case it is shunt wound, the action of the solenoid can be made to maintain the proper speed irrespective of any voltage fluctuations in the supply circuit, by having some slip in the magnetic coupling 18—19—20 at the average electromotive force of the supply circuit, thus allowing the solenoid to maintain the speed desired by diminishing or increasing the friction load. With a series wound motor, the action of the magnetic coupling 18—19—20 and of the disk 45, which in this case would be of metal, will be similar to the mechanism described in my copending application; except that in the present invention, the effect of fluctuations

in the voltage of the supply circuit will be corrected by the solenoid varying the friction.

The disk supporting the coils of wire may be made of either a metallic or a non-metallic material. In the case of a non-metallic material, the necessary regulation of the speed would be performed entirely by the current acting through the solenoid on the friction disk. While in my opinion, a metallic disk is not necessary for the successful operation of the machine, I recommend its use, since the retarding effect of the eddy currents generated in the disk, as described in my copending application, may be made to act in such a manner as to assist the action of the current generated in the windings. This may be done, for instance, by providing the supporting disk with suitable cut-out portions. As the magnitude of the counter torque due to the friction of the stylus on the record, and that due to the reaction between the magnet and the coils of wire, depends upon the position of the tone arm, the metallic disk supporting the coils may be provided with suitable cut-out portions to be determined by experiment, thus allowing the counter torque due to the eddy currents generated in the disk for various positions of the magnet, to balance the changes in the counter torque enumerated above. In this case, therefore, the sole function of the solenoid acting on the friction disk, would be to supply a frictional counter torque to compensate for the varying strength of the spring. The exact configuration of these cut-out portions would be determined by experiment.

I have shown an embodiment of my invention, but it is clear that changes may be made therein without departing from the spirit of the invention as defined in the appended claims.

I claim:

1. In a phonograph having a record disk, a stylus, and means for rotating the record disk, means actuated by said first named means for producing an electromotive force by electromagnetic induction, and means acted upon by the electric energy corresponding to the produced electromotive force, said means operating to vary the speed of rotation of the record disk on the variation of the induced electromotive force.

2. In a phonograph having a record disk, a stylus, and means for rotating the record disk at a constant linear velocity relatively to the stylus, means actuated by said first named means for producing an electromotive force by electromagnetic induction, and means acted upon by the electric energy corresponding to the produced electromotive force, said means operating to vary the speed of rotation of the record disk on the variation of the induced electromotive force

from that electromotive force produced corresponding to a constant linear velocity of the record line and stylus relatively to each other.

3. In a phonograph, the combination of a record medium, a medium coacting therewith, and members coacting with each other and in magnetic relationship with each other, with means for changing the position of one of said members relatively to the other, upon the change of the position of the coacting medium upon the record medium, means capable of changing the linear velocity of the record medium and the coacting medium relatively to each other, on the change of position of one of said members relatively to the other, and means on one of the members for inducing therein when in magnetic relationship with the other member an electromotive force, for controlling said last-named means.

4. In a phonograph having a record disk, a movable tone-arm, means for moving the record disk, a rotary member rotated with the record disk, means movable by the tone-arm, the last-named means and rotary member being movable with respect to each other and being in magnetic relationship to each other for the purpose of regulating the speed of the record disk, means moved by the rotary member for inducing therein, when in magnetic relationship with the other member, an electromotive force, and means for utilizing the electric energy generated, for controlling the movement of the rotary member and record disk.

5. In a phonograph having a record disk, means for actuating the record disk, and a movable tone-arm, a magnet movable with the tone-arm, a coil of wire movable to cut the lines of force of the magnet for generating an electric current, means actuated by said current, and means actuated by said last-named means and operating on the means for rotating the record disk.

6. In a phonograph having a record disk, means for actuating the record disk, and a movable tone-arm, a magnet movable with the tone-arm, a coil of wire for cutting the lines of force of the magnet for generating an electric current, means for moving the coil of wire, means actuated by said current, and means actuated by said last-named means and operating on the means for moving the coil of wire.

7. In a phonograph, having a record disk and a stylus, means for rotating the record disk, a magnet, means rotating between the poles of the magnet and cutting the lines of force of said magnet, the linear velocity of said portion of said means between the poles bearing a constant relationship to that of the record line and stylus for inducing an electromotive force therein proportionate to a constant linear velocity of each

portion of the record line as it passes underneath the stylus, and means acted upon by said electromotive force and operated by any variation of the electromotive force above or below that corresponding to the said constant linear velocity, for regulating the record disk rotating means to modify the operation thereof to obtain the said constant linear velocity.

8. In a phonograph having a record disk, and means for moving the same, a support movable with the record disk, a magnet movable in respect to the support during its rotation, coils arranged on the support, movable between the poles of the magnet, a commutator connected with the ends of the coils, means operated by the current taken from the commutator, and a friction device operated by said means.

9. In a phonograph having a record disk, and means for moving the same, a support movable with the record disk, a magnet movable in respect to the support during its rotation, coils arranged on the support, movable between the poles of the magnet, a commutator connected with the ends of the coils, a solenoid, conductors connected with the commutator and with the solenoid, a core in the solenoid, a lever pivotally supported, having one end connected with the core of the solenoid, and connected with an adjusting spring, a friction disk rotatable with the support, and friction pads on the other end of the lever from that to which the adjusting spring and core is connected, for exerting a varying pressure on the friction disk.

10. In a phonograph, the combination of a record medium having a record line, a medium coacting with said record medium, the said mediums being relatively movable to each other, a member capable of having an electromotive force induced therein, a second member in magnetic relationship with the first member, the said members being relatively movable to each other for producing an electromotive force in the first member by electromagnetic induction, and means transmitting the relative movement of the mediums in respect to each other to said members, so that the said members correspond in their relative movement to the relative movement of said mediums, whereby the electromotive force induced bears approximately the relationship to a constant linear velocity of each portion of the record line and said coacting medium relatively to each other.

11. In a phonograph, the combination of a record medium having a record line, a medium coacting with said record line, the said mediums being relatively movable to each other, members coacting with each other and in magnetic relationship with each other, means on one of said members

for inducing therein an electromotive force, means acted upon by the resulting electric energy, and operated by any variation therein and means operated by said last-named means for regulating the angular
5 velocity of the record medium on the variation of the induced electromotive force from constancy.

12. In a phonograph, the combination of
10 a record medium having a record line, a medium coating with said record line, the said mediums being relatively movable to each other, members coating with each other and in magnetic relationship with
15 each other, means on one of said members for inducing therein an electromotive force, means operated by the resulting electric

energy, and means operated by said last-named means for regulating the relative linear velocity of the record and coating
20 mediums at their coating point, on the variation of the electromotive force induced from that electromotive force which bears an approximately constant relationship to the constant linear velocity of each portion
25 of the record line and coating medium, relatively to each other.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

ALBERT RÜCKGABER.

Witnesses:

C. P. GOEPEL,

G. LOWE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

AUTOMATIC BRAKE MECHANISM FOR
PHONOGRAPHS,

#1,212,872-----F. H. Adams,
Patented-January 16th, 1917.
Filed-January 22nd, 1915.
Renewed-December 1st, 1916.

F. H. ADAMS.
 AUTOMATIC BRAKE MECHANISM FOR PHONOGRAPHS.
 APPLICATION FILED JAN. 22, 1915. RENEWED DEC. 1, 1916.

1,212,872.

Patented Jan. 16, 1917.

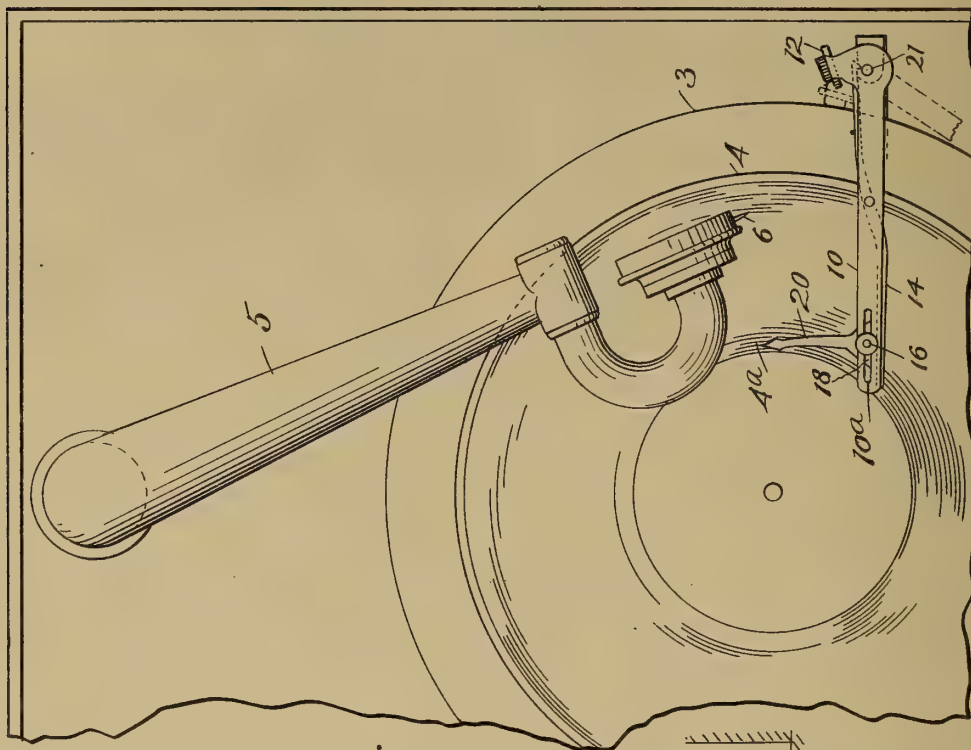


Fig. 1.



Fig. 2.

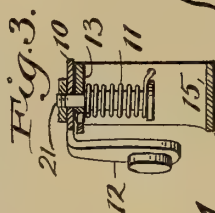


Fig. 3.

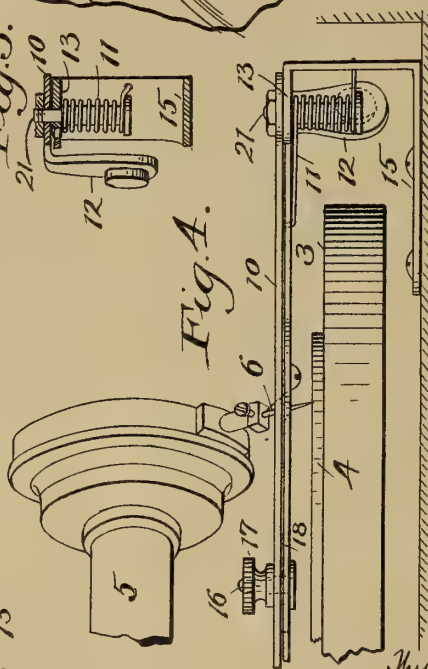


Fig. 4.

Witnesses
 E. B. Gilchrist
 C. V. Schuyler

Inventor
 Frank H. Adams
 by
 Thurston Davis
 Attorney

UNITED STATES PATENT OFFICE.

FRANK H. ADAMS, OF CLEVELAND, OHIO.

AUTOMATIC BRAKE MECHANISM FOR PHONOGRAPHS.

1,212,872.

Specification of Letters Patent.

Patented Jan. 16, 1917.

Application filed January 22, 1915, Serial No. 3,673. Renewed December 1, 1916. Serial No. 134,500.

To all whom it may concern:

Be it known that I, FRANK H. ADAMS, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Automatic Brake Mechanism for Phonographs, of which the following is a full, clear, and exact description.

The invention is adjunctive in character and is especially adapted for use in connection with disk phonographs, and may be applied to any disk phonograph without involving any change in any part of said phonograph.

One object of the invention is to provide a cheap and easily applied device which will automatically stop the phonograph when the playing of a record thereby has been completed.

Another object is to provide a stopping device in a form such that it may be easily and quickly adjusted to perform its functions with any record regardless of the distance between the center of the record disk and the point thereon at which the reproducing grooves end.

Another object is to provide a stopping device in a form such that it does not interfere with putting a record on or taking it from the phonograph turntable.

The invention consists in the construction and combination of parts shown in the drawing and hereinafter described and pointed out definitely in the appended claims.

In the drawing, Figure 1 is a plan view of the invention applied to a phonograph; Fig. 2 is a bottom view of the device; Fig. 3 is a vertical section through the outer part of the stop mechanism; and Fig. 4 is an elevation of the device and so much of the phonograph as coöperates therewith.

The application of this invention to, and its use with, any disk phonograph, does not involve any change whatever in the construction of the phonograph itself, although the said invention is caused to be operated by certain parts of said phonograph. The parts of the phonograph which coöperate with this invention include the turntable 3 upon which a disk record 4 may be supported, the tone arm 5 which is mounted to swing freely upon a vertical axis, and some part carried by the tone arm, preferably the needle 6. An arm 10 extends horizontally over the turntable and the disk record thereon from one side

to a point beyond the place 4^a at which the reproducing grooves on the disk record will end. A spring-actuated brake lever 12 is pivoted on a vertical pivot adjacent to the edge of the turntable and in such position that when released from restraint the brake lever, actuated by its spring 11, will swing into engagement with the edge of the turntable and thereby apply such braking pressure thereto as will stop its rotation.

In the very simple construction shown, the arm 10 and the brake lever 12 are integral with each other and are pivoted to the upper horizontal arm 13 of a bracket 15, which is adapted to be secured to a suitable part of the phonograph case or cabinet. A catch lever 14 is pivoted to the under side of the arm 10. On the outer end of this lever there is a finger 14^a which is adapted to enter a notch 13^a that is formed in the arc-shaped edge of the said arm 13. The arm 10 is provided near its free end with a longitudinal slot 10^a. A stud 16 is slidable in this slot and may be fixed to the arm at any point thereon within its range of travel. In the particular construction shown the part of the stud which passes through this slot is threaded to receive a nut 17. By tightening this nut the stud may be secured to the arm at any desired point thereon. A cam 18 is pivoted to the projecting lower end of the stud, and this cam is always in contact with an edge of the catch lever near the outer end thereof. Fixed to this cam is a trip finger 20 which projects into the path of some part of, or attachment to, the swinging tone arm 5. Preferably this finger projects into the path of the needle 6.

The described device operates as follows: When a record disk 4 is being put onto the turntable the arm 10 will be in the position indicated by dotted lines in Fig. 1 which shows a part of said arm. When the record disk is on the turntable the arm will be swung to position shown by full lines in said Fig. 1, that is to say, the position such that it extends over a part of said record disk. When it reaches the required position the catch lever 14 will be moved by the spring 11 so as to push the catch finger 14^a into the notch 13^a, and thereby the arm 10 will be held in the stated position. Then the stud 16 will be moved along the arm 10, as required, to bring the end of the trip finger 20 directly over a part of the disk record on which the non-reproducing grooves are

found. One can readily see when the trip finger has been put in the proper position, because the reproducing grooves on the record present quite a different appearance than the non-reproducing spiral grooves which are formed on each record disk for the needle to travel in after the record has been played. When this trip finger has been properly positioned, the stud may be fixed to the arm 10 by screwing down the nut 17. As the record is being played the tone arm will be gradually swung toward the center of the turntable, the needle 6 traveling in the reproducing spiral grooves of the record. Just as the needle passes out of these reproducing grooves and into the other non-reproducing grooves, it will engage the trip finger 20 and move it so that the cam will move the catch lever 14 and thereby withdraw the catch finger 14^a from the notch 13^a. Immediately thereafter this arm, actuated by its spring 11, will swing toward the position indicated by the dotted lines in Fig. 1; and, of course, the brake lever 12 will also swing until its braking surface engages the periphery of the turntable and stops its rotation.

In the specific construction shown the pivot stud 21 on which the arm 10 is pivoted to the bracket arm 13, extends down a considerable distance; and the spring 11, which is a spiral spring, embraces it and has one end connected with the bracket 15. The other end is bent up so as to engage the edge of lever 14. Therefore, this one spring actuates both the catch lever and the swinging arm 10,—and this because after the spring has moved the catch lever as far as it will go relatively to said arm, it will continue to exert its force on the arm itself.

It is to be understood that the specific construction shown, while the best embodiment of the invention known to me, is merely one specific form of an invention which may be embodied in many different specific forms. The fundamentally novel feature of the invention is the arm which extends over the record and carries a movable trip finger which projects into the path of some part carried by the tone arm of the phonograph, and is adjustable lengthwise of said arm so that it will be engaged and moved with the result of causing the brake to set when the needle reaches any desired part of the record.

Having thus described my invention, what I claim is:—

1. A stopping attachment for disk phonographs of the type having a rotary turntable and pivoted tone arm, comprising in combination a pivoted arm adapted to extend horizontally over a part of a disk upon the phonograph turntable, a spring for swinging said arm away from said position, restraining means preventing the spring-

induced movement of said arm, a brake for stopping the phonograph which is moved in the brake applying direction by the spring-induced movement of said arm, a trip finger carried by said arm and adapted to project into the path of a part of the phonograph which is carried by the tone arm thereof, and means whereby the trip finger by its movement releases said arm from said restraining devices.

2. A stopping attachment for disk phonographs of the type having a rotary turntable and pivoted tone arm, comprising in combination a pivoted arm adapted to extend horizontally over a part of a disk upon the phonograph turntable, a spring for swinging said arm away from said position, restraining means preventing such spring induced movement, a brake for stopping the phonograph which is moved in the brake applying direction by the spring induced movement of said arm, a trip finger which is adjustable lengthwise of said arm and adapted to project into the path of a part of the phonograph which is carried by the tone arm thereof, and means whereby the trip finger by its movement releases said arm from said restraining devices.

3. A stopping attachment for disk phonographs of the type having a rotary turntable and pivoted tone arm, comprising in combination a pivoted arm adapted to extend horizontally over a part of a disk record upon the phonograph turntable, a bracket arm to which said arm is pivoted, which bracket arm is provided with an arc-shaped edge in which there is a notch, a catch lever pivoted to said arm and having a finger adapted to enter said notch, a cam pivoted to said arm in position to engage with said catch lever, a trip finger connected with said cam and adapted to project into the path of a part of the phonograph which is supported on the swinging tone arm thereof, a spring acting to swing said arm away from its initial position and a brake adapted to be operated by the spring-induced movement of said arm, for stopping the phonograph.

4. A stopping attachment for disk phonographs of the type having a rotary turntable and pivoted tone arm, comprising in combination a pivoted arm adapted to extend horizontally over a part of a disk record upon the phonograph turntable, a bracket arm to which said arm is pivoted, which bracket arm is provided with an arc-shaped edge in which there is a notch, a catch lever pivoted to said arm and having a finger adapted to enter said notch, a cam pivoted to said swinging arm on a pivot which is adjustable lengthwise of the arm, a trip finger connected with said cam and adapted to project into the path of a part of the phonograph which is supported on the swinging

tone arm thereof, a spring acting to swing said arm away from its initial position, and a brake adapted to be operated by the spring induced movement of said arm for stopping the phonograph.

5 5. A stopping attachment for disk phonographs of the type having a rotary turntable and pivoted tone arm, comprising in combination a pivoted arm adapted to extend horizontally over a part of a disk record upon the phonograph turntable and a brake arm rigidly fastened to said swinging arm, a spring acting upon said arm to swing it away from the position stated and to a position such that the brake arm will engage with the periphery of the turntable, means restraining said arm from moving in the direction which it is impelled to move by said spring, and a trip finger carried by said arm and adapted to project into the path of a part which is carried by the swinging tone arm of the phonograph, and means whereby the movement of said trip finger will disconnect the swinging arm from said restraining devices.

6. A stopping attachment for disk phonographs of the type having a rotary turntable and pivoted tone arm, comprising in combination a fixed bracket adapted to be located outside of said turntable and having a horizontal arm whose edge is arc-shaped and is formed with a notch, a spring actuated arm pivoted to said bracket arm, a brake fixed to said pivoted arm, a spring actuated catch lever mounted on said swinging arm and provided with a finger adapted to enter said notch, a cam stud carried by and adjustable along said swinging arm, a cam pivoted on said stud in position to engage a part of said catch lever, and a trip finger fixed to said cam and extended therefrom to a position such that it may be engaged and operated by some part fixed to the tone arm of the phonograph.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

FRANK H. ADAMS.

Witnesses:

E. L. THURSTON,

A. J. HUDSON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

METHOD OF PRODUCING MAGNETIC SOUND-
RECORDS FOR TALKING-MOTION-PICTURE
FILMS,

#1,213,150-----Henry C. Bullis,
Patented-January 23rd, 1917.
Filed-December 15th, 1915.

H. C. BULLIS.
METHOD OF PRODUCING MAGNETIC SOUND RECORDS FOR TALKING MOTION PICTURE FILMS.
APPLICATION FILED DEC. 15, 1915.

1,213,150.

Patented Jan. 23, 1917.
2 SHEETS—SHEET 1.

Fig. 1.

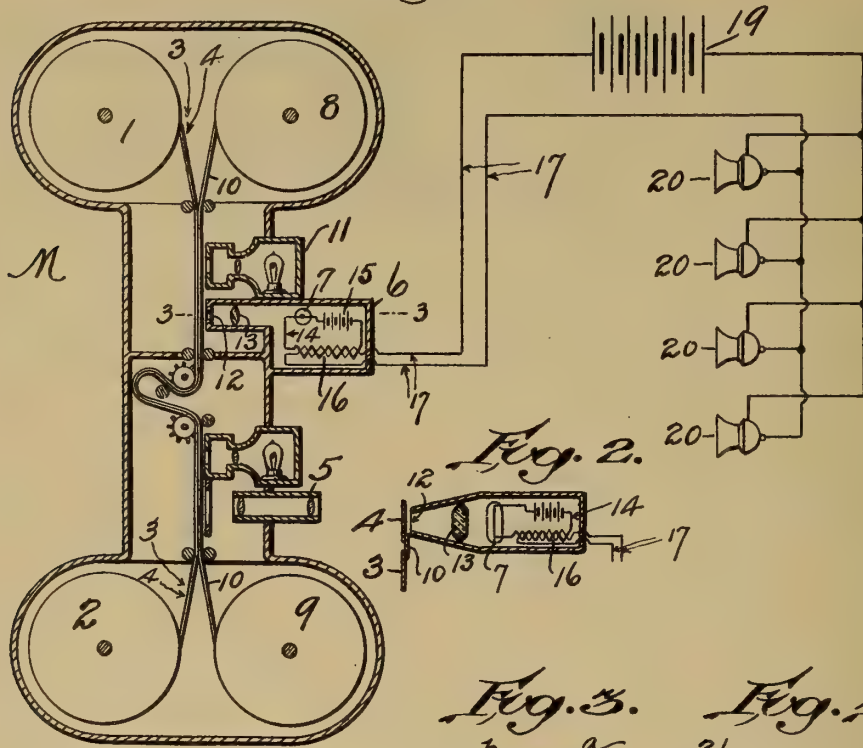


Fig. 2.

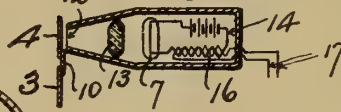


Fig. 3.

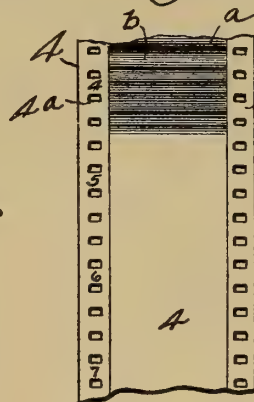


Fig. 4.

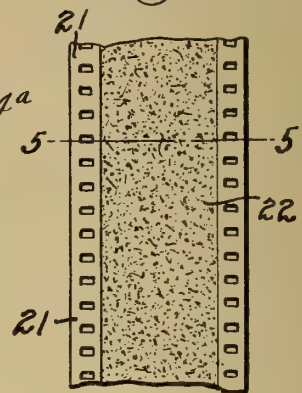
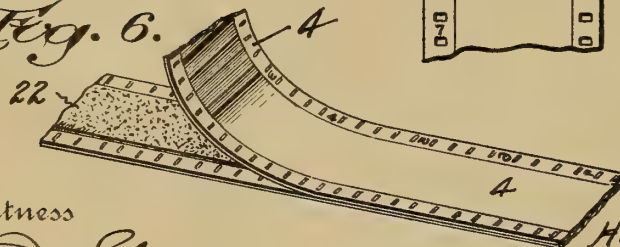


Fig. 5.



Fig. 6.



Witness

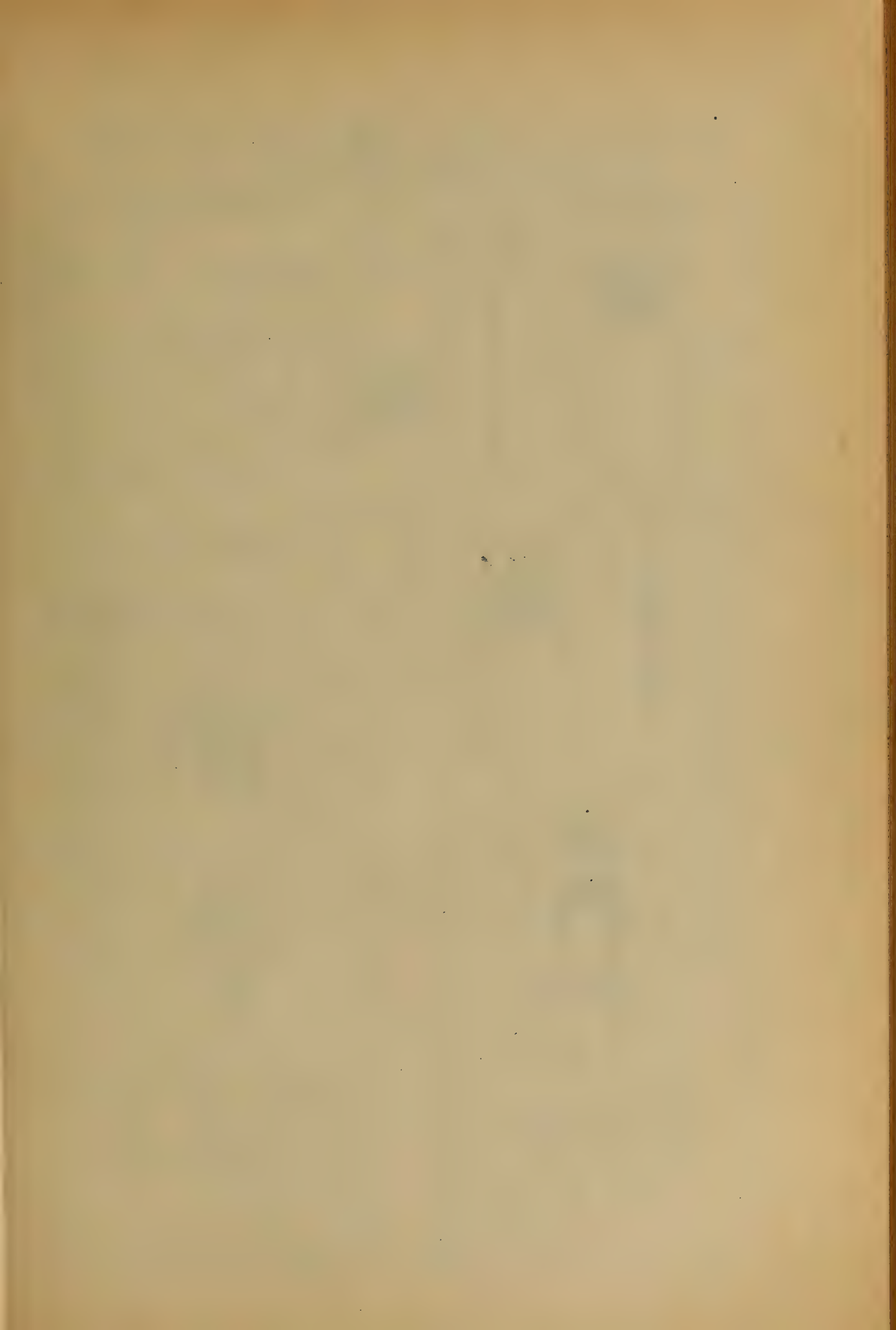
Ernest L. Hoff

By

Inventor

HENRY S. BULLIS

W. W. Volkmann
Attorney



H. C. BULLIS.
 METHOD OF PRODUCING MAGNETIC SOUND RECORDS FOR TALKING MOTION PICTURE FILMS.
 APPLICATION FILED DEC. 15, 1915.

1,213,150.

Patented Jan. 23, 1917.

2 SHEETS—SHEET 2.

Fig. 7. Fig. 8

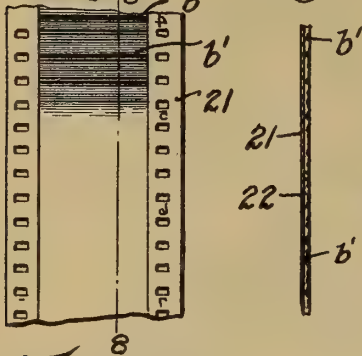


Fig. 9.

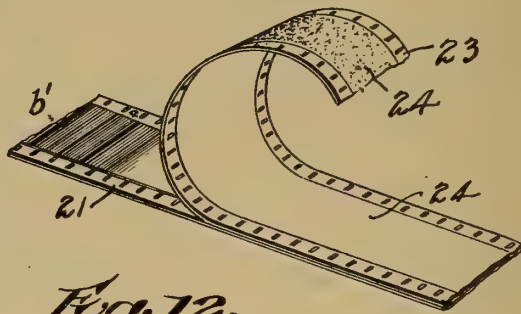


Fig. 10.

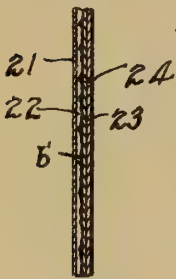


Fig. 11. Fig. 12.

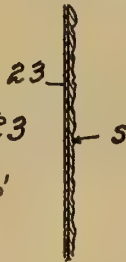
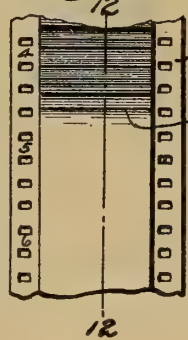


Fig. 15.

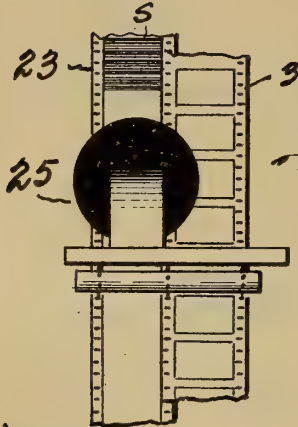
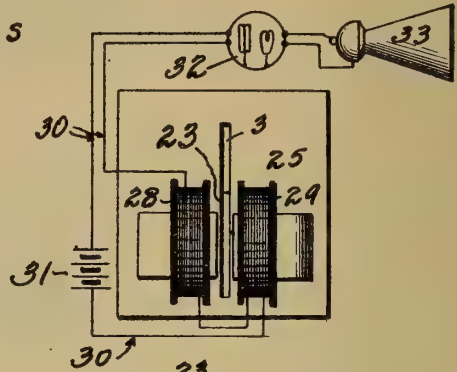


Fig. 14.

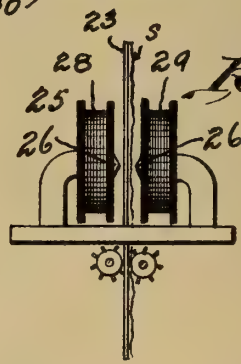


Fig. 13.

Witness

Emory Shoff

By

Inventor

HENRY C. BULLIS

S. J. W. Whan
 Attorney

UNITED STATES PATENT OFFICE.

HENRY C. BULLIS, OF REDWOOD FALLS, MINNESOTA.

METHOD OF PRODUCING MAGNETIC SOUND-RECORDS FOR TALKING-MOTION-PICTURE FILMS.

1,213,150.

Specification of Letters Patent. Patented Jan. 23, 1917.

Application filed December 15, 1915. Serial No. 67,088.

To all whom it may concern:

Be it known that I, HENRY C. BULLIS, a citizen of the United States, residing at Redwood Falls, in the county of Redwood and State of Minnesota, have invented certain new and useful Improvements in Methods of Producing Magnetic Sound-Records for Talking-Motion-Picture Films, of which the following is a specification.

This invention relates to the general subject of acoustics and has special reference to a process for producing a sound record that is particularly adapted to be utilized in connection with motion picture films.

As is well known, various efforts have been made to produce the so-called talking motion pictures, the most common and widely known method being the combination of the motion picture and mechanical talking machine. However, great difficulty has been experienced in properly synchronizing these two separate instrumentalities to obtain a perfect synchronism and syntonism between the pictures and speech sounds belonging thereto, and therefore an entirely electrical method has been sought whereby the sound record could be recorded simultaneously with the taking of the pictures, and also translated simultaneously with projecting thereof. Accordingly, after much experimenting, a method of this general character was evolved and in attaining the desired end, the variations in the intensity of light produced by a "talking arc" were photographed on a continuously moving film by means of suitable lenses. After being developed, the resulting photogram was passed between a source of light and a selenium cell included in a reproducing circuit, whereby light rays of varying intensity were caused to fall on the cell and thereby vary its electrical resistance. Thus, with the aid of suitable electrical and sound magnifying devices included in the cell circuit, the record on the film strip was translated into audible speech sounds. Although this method of producing the so-called talking pictures eliminated many of the objections incident to the combination of the separate mechanical instruments above mentioned, it has not, for various practical reasons, come into commercial use. One of the most pronounced objections to this latter method as heretofore practised, is due to the fact that it is difficult to provide suitable mechanical devices

whereby the sound and pictures may be accurately recorded on the same film, since the pictures must be recorded on an intermittently moving portion of the film, while the sound record is made on a continuously moving portion. Therefore, I have found that it is more practical as set forth in my copending application Serial No. 67,087 filed Dec. 15, 1915, to record the sound and picture on separate films which move in synchronism and have suitable registering means recorded thereon, whereby they may be readily matched to attain the result of producing the pictures and their corresponding speech sounds simultaneously. This two-film method not only renders the attainment of the ultimate object in a commercially practical manner, with the use of a selenium cell to translate the sound record, but at the same time makes possible the use of an entirely new and different method of reproducing the sounds. That is to say, by having the films separate, but capable of being readily matched in proper relation, it is possible to utilize the sound record made on a film by the apparatus shown in my copending application aforesaid to form another sound record that may be magnetically translated instead of by the use of an electrical cell such as heretofore. In other words, I propose to use the film containing a sound record produced by the result of photographing varying intensities of light as a master negative for making sound films having metallic sound images thereon corresponding in magnetic permeability to the varying light striations on the master film. Accordingly, it will be apparent that the present novel method has in view the utilization of a master photographic negative film for producing a positive metallic sound record film, which may be readily translated by being passed between the poles of an electromagnetic inductive device which is included in an electric circuit with suitable means for amplifying and transmitting the speech sounds.

A further and more specific object of the present method is to utilize a source of sound controlled light which will produce a negative that may be used for printing without making a reversed image. In other words, it is proposed to make a negative which may be used direct to print its sound image on a film having thereon a sensitized gelatinous

coating carrying a finely divided metallic substance in suspension, and which becomes fixed in a series of images corresponding to the light striations on the original negative or master film to provide a plurality of transverse lines of metallic material of varying magnetic permeability.

Although the present method may be carried out in various ways, and by any convenient means, one form of apparatus is illustrated in the accompanying drawings wherein—

Figure 1 is more or less diagrammatic view of the means employed for making the photographic light record of master negative of the sound waves. Fig. 2 is a detail sectional view taken on the line 3—3 of Fig. 1 showing diagrammatically the device used for producing varying flashes of light corresponding to the varying volume or intensity of the sound waves. Fig. 3 is a detail view of a portion of the film strip having thereon the photogram resulting from the first step performed in the apparatus of Fig. 1. Fig. 4 is a detail view of a portion of a film strip having thereon a sensitized gelatinous coating containing a finely divided metallic material in suspension, and which is used as a base on which to print the negative master record. Fig. 5 is an enlarged cross sectional view on the line 5—5 of Fig. 4. Fig. 6 is a view illustrating the second step of the present method, wherein the photogram strip shown in Fig. 3 is placed upon the surface of the sensitized coating on the strip shown in Fig. 4 for printing. Fig. 7 is a detail plan view of a portion of the magnetic strip having the sound image printed thereon. Fig. 8 is a detail sectional view on the line 8—8 of Fig. 7. Fig. 9 is a view illustrating the third step of the method which involves the attaching of a permanent film strip to the sound images hardened by the action of light on the sensitized coating. Fig. 10 is a longitudinal sectional view of the parts shown in Fig. 9. Fig. 11 is a detail plan view of the final metallic sound record. Fig. 12 is a longitudinal sectional view on the line 12—12 of Fig. 11. Fig. 13 is a detail view of a type of magnetic inductive device for translating the sound recorded on the strip in Figs. 12 and 13. Fig. 14 is a front elevation of the apparatus shown in Fig. 13, and also illustrating how the picture strip made concurrently with the photogram strip may be reproduced along with the magnetic sound record strip. Fig. 15 is a top plan view of the construction shown in Fig. 13 with the talking circuit diagrammatically indicated.

Similar reference characters designate corresponding parts throughout the several figures of the drawings.

A novel feature of the present method in-

volves the making of a master negative in the form of a photogram record film, which is a photographic record of different intensities of light, caused by the inductive effect of a microphone circuit reacting upon a normally fixed light circuit. In other words, it is proposed to produce a sound record film by means of a flash lamp inductively coupled with a microphone circuit, so that the light flashes from the lamp will be inversely related to the sound waves. The sound record thus produced on the negative assumes the form of a plurality of transverse lines extending entirely across the strip, the same being of different intensity and varying in width, and hereinafter referred to as striations. After the master negative is made, it is developed and utilized for the making of a metallic sound record, which latter is preferably carried on a film strip of the type usually employed in motion picture machines. Thus, it will be apparent that the present sound record is especially adapted to be combined with the usual picture strip to produce the so-called talking motion pictures.

Although the several steps of the present method involving the novel features set forth may be attained through the use of various suitable instrumentalities, I have illustrated one form of apparatus in the accompanying drawings, and to this end, I preferably utilize a recording apparatus similar to that shown in my co-pending application, Serial No. 67,087, filed Dec. 15, 1915. As illustrated in Figs. 1 and 2 of the present case, the said recording apparatus is designated in its entirety by the reference character M, and includes suitable reeling devices 1 and 2 for passing both a picture strip 3 and photogram strip 4 respectively before a picture recording lens device 5 and a sound recording device 6 which includes a varying source of light 7. The reeling devices 8 and 9 carry a film strip 10 for recording on both the picture strip 3 and photogram strip 4 suitable marks of identification as described in my application aforesaid, whereby the two strips may be readily matched.

Referring more particularly to the photogram strip 4 which is transferred from the upper reel 1 to the lower reel 2 along with the picture strip 3, it will be seen that the same may be passed before a source of light 11 for printing thereon suitable identification marks, and is then passed before the relatively narrow horizontally disposed slot 12 of the sound recording device 6 to receive the light flashes focused through the slit by means of a concentrating lens 13. In this sound recording device 6, the source of recording light is preferably a relatively long electric lamp which is disposed longitudinally of the interior of the casing of the device, so that the single tungsten filament

thereof may be parallel with the slot 12. This lamp is a part of a lamp circuit designated as 14 and including a source of electrical energy 15, and under normal conditions, the flow of current in the circuit is such that the filament of the lamp gives a steady, bright glow. The circuit 14 in which the sound controlled flash lamp 7 is arranged, has a portion thereof forming one winding of an induction coil 16, another winding of which is formed by a portion of the microphone circuit 17. This latter circuit includes a source of electrical energy 19 and a plurality of microphones 20, and as will be apparent, is inductively coupled with the light circuit 14.

Now, in the present device, where it is desired to make a negative sound record in which the most transparent striations represent the variations in sound and the darkest represent silent or relatively silent intervals, it is necessary that the result of the inductive effect of the current in the microphone circuit upon the current in the lamp circuit shall be of such a nature as to oppose the flow of current in the lamp circuit. In other words, the current in the coil of the microphone circuit must work in opposition to the current in the coil of the lamp circuit to produce an inductive resistance to the flow of the current in the lamp circuit. This effect is just the opposite to that required where it is necessary to increase the amount of light given off by the filament of the lamp in the lamp circuit, as is necessary in the case where the negative is made for production by means of a selenium cell, as set forth in my copending application hereinbefore mentioned. These microphones 20 above referred to may, of course, be arranged in any desirable location, and when receiving sounds that are to be recorded vary the resistance in the microphone circuit, which by induction produces a reactive effect upon the current normally flowing through the circuit 14 so that the filament of the lamp varies in its brightness in accordance with the inductive resistance imposed by the microphone circuit upon the lamp circuit. That is to say, the induction coil coupling between the light circuit and the microphone circuit causes the lamp to flash dimly for loud sound waves, and vice versa with a corresponding graduated relation between the light flashes and the sound waves for tones between these two extremes. This has the effect of photographing a light or transparent striation on the negative film for loud tones and vice versa, with the result that when the positive film is finally developed, the sound striations will correspond in amplitude or character to the original sound waves. In other words, the normal bright light of the lamp representing a silent interval will produce the darkest striations

on the negative master film, while the weaker flashes representing the sounds will produce a more transparent striation. Thus, by the use of this type of light which is inductively coupled with the microphone circuit, it is possible to produce what may be termed a "positive" negative light record. That is to say, the light record made by this means may be used to directly print the permanent metallic sound record without the intermediate step of making a reversed image film. Heretofore, it has been necessary to first make a negative light record, then make a reversed image negative, whereby the proper sound striations might be reproduced in printing duplicates, but this is entirely eliminated with the present type of flash lamp. Accordingly, from the foregoing, it will be clear that the first step of the present process consists in making a "positive" master negative light record film, by means of a flash lamp arranged in a light circuit which is inductively coupled with a microphone circuit, and then developing the strip to define the sound image. The film will then appear substantially as shown in Fig. 3 of the drawings, wherein it will be observed that the sound is recorded in a plurality of striations of varying width and intensity extending transversely across the full width of the body of the film, the marginal edges 4^a being provided with the usual traction openings, and also as indicated in this figure, the darkest or most intense striations *a* represent the relatively silent intervals between the rapidly recurring lighter striations *b* which represent the different qualities of recorded sounds.

In Figs. 4 and 5 of the drawings, there is shown what may be termed a temporary film strip designated as 21, and having its body portion provided with a sensitized gelatinous coating 22 containing finely divided metallic material in suspension. Although various kinds of coating composition may be successfully adapted for this purpose, a simple and practical coating composition is an emulsion of gum bichromate containing finely divided iron particles or other suitable para magnetic material, held in suspension therein.

The next step in this novel method is shown in Fig. 6 of the drawings, wherein this temporary strip 21 having thereon the sensitized gelatinous coating has laid upon it the photogram film 4. The light record of the film 4 is then printed on the sensitized coating 22 whereby the light record is converted into a sound record on the temporary film by hardening the gelatin in all places where the light penetrates as indicated in Fig. 7. That is to say, when the images of the strip 4 are printed on the coating 22 the light will penetrate more or less all of the transparent and nearly transparent striations

tions *b* on the film 4 which represent sounds of varying quality and pitch. Thus, there is printed on the coating 22 of the temporary strip 21 a metallic sound record *b'* corresponding in magnetic permeability to the amplitude or character of the original sound waves as indicated by the light striations. As will appear more clearly by a sectional view taken on the line 8—8 of Fig. 7 where the sound striations were the lightest on the negative, the gelatinous coating containing the magnetic material becomes hardened to the greatest depth, while in places where the sound striations are relatively small, the light striations on the negative were the darkest, thus representing weaker sounds. Thus, the entire surface of the gelatinous coating becomes hardened to a more or less greater depth according to the degree or intensity of the light admitted by the photogram film during the printing process. The heavy portions *b'* of Fig. 8 represent the portions of the magnetic coating hardened by the light, thus leaving the coating beneath the heavy portions, and next to the temporary film strip 21 in a relatively soft condition. Thus, should this magnetic strip be subjected to a bath for removing the soft or unhardened gelatin, it will be apparent that the hardened or set gelatinous portions would be practically without any support. Therefore, in order to preserve the entire sound record made by printing the light photogram on the sensitized gelatinous coating, it is necessary to provide the metallic record with a permanent backing, and this must be accomplished prior to subjecting the sensitized temporary film strip to the bath above referred to. Accordingly, to provide a permanent support or backing for the hardened sound record material, the surface thereof has applied thereto a permanent carrier strip 23. This third step is illustrated in Fig. 9 of the drawings wherein it will be observed that the strip 21 having the magnetic coating 22 has impressed on the face of the hardened metallic record material, the permanent record strip 23 which carries on one side thereof an adhesive substance 24 that securely grips and adheres to all of the hardened metallic striations, as shown in Fig. 10. The composite structure shown in the latter figure is then subjected to a suitable bath whereby soft portions of the gelatin are removed, and the temporary film is removed or stripped, thus leaving an irregular surface *s* of magnetic material permanently secured to the film strip 23, as shown in Figs. 11 and 12. After the permanent magnetic record film strip is thus produced, it may be then translated by being passed between the poles of a suitable electromagnetic device 25, such for instance as shown in Figs. 13, 14, and 15 of the drawings. In these figures, the references 26—26

designate the opposite pole pieces of a magnet device which may be of the electromagnetic type or permanent type as shown and having the coils 28 and 29 which are included in an electric circuit 30. (Fig. 15). This circuit also includes a source of electrical energy 31, and suitable sound amplifying devices designated generally as 32, and a loud speaking telephone device 33. Accordingly, it will be apparent that the metallic sound record produced in accordance with the steps of the foregoing method may be utilized together with the motion picture film, as shown in Fig. 14 to produce the so-called talking pictures, the speech sounds corresponding to each picture being translated according to the well known telegraphophone principle.

Even though the translation of these speech sounds is accomplished by the telegraphophone principle, the sound record produced by the present method possesses many points of superiority and many advantages over the usual steel wire strip common to the telegraphophone method. One of these advantages is that it is possible to place the sound record on a film strip which is of the same character as the picture strip, whereby the sound record strip may be moved through a standard type of motion picture machine along with the usual picture film. Another advantage is that the magnetic sound record produced by this method is much more enduring than a record made upon a steel wire or strip, since it is difficult for the latter to hold its magnetism for any length of time, while according to the present method each sound striation contains exactly the same amount of metallic material at all times that is originally given to it by the light passing through the photogram negative.

From the foregoing, it is believed to be apparent that the present novel method essentially consists in making a light photogram of sounds of varying quality and pitch by means of a flash lamp arranged in a circuit which is inductively coupled with the microphone circuit. The resulting light photogram is then developed and used as a "positive" master negative for printing upon a temporary film strip having thereon a sensitized gelatinous coating containing finely divided magnetic material. The printing of the photogram on this sensitized gelatinous coating thus produces a series of hardened gelatinous metallic striations corresponding in magnetic permeability to the intensity of the light striations of the photogram. Prior to subjecting the temporary film strip having thereon the metallic sound record to a suitable photographic bath, the same has secured to its face on which the striations occur, a permanent film strip whereby all parts of the gelati-

nous coating not hardened by the action of light will be washed away from the permanent sound record strip while the metallic sound striations will be secured thereto.

5 After the sound record is thus produced on the permanent film strip, it may be translated by suitable electro-magnetic devices along with the projection of an accompanying picture strip to produce the so-called
10 talking motion pictures.

I claim:

1. A method of photographing sound records on a sensitized record medium which consists in flashing thereon light beams, and
15 causing said light beams at the source to be inversely varied in intensity by the sound waves to be recorded.

2. A method of photographing sound records on a sensitized record medium which consists in flashing light beams thereon in a series of transverse striations, and causing
20 said light beams at the source to be inversely varied in intensity by the sound waves to be recorded.

3. A method of producing sound records which consists in photographically producing a positive negative master record of sound controlled light flashes which are inversely related to the sounds, then printing
25 the said master negative on a sensitized surface containing finely divided metallic material in suspension, and subsequently removing all of said sensitized coating not hardened by printing the master negative on
30 said sensitized surface.

4. A method of producing sound records which consists in producing a photogram record of sound controlled light flashes which are inversely related to the sound waves, then printing said photogram record
35 on the sensitized coating of a temporary

film strip, then providing the printed sensitized surface with a permanent backing strip, and subsequently removing all of the sensitized coating not hardened in the printing step and also stripping the temporary film strip from the permanent backing. 45

5. A method of producing sound records which consists in producing a photogram record of sound controlled light flashes
50 which are inversely related to the sound waves, then printing said photogram record directly on a sensitized metallic coating carried by a temporary film strip, then attaching a permanent backing strip to the hardened surface of the sensitized metallic coating, and subsequently removing all of the sensitized coating not hardened in the printing step, and also stripping the temporary film strip from the permanent backing. 55

6. A method of producing sound records which consists in producing a photogram record of sound controlled light flashes which are inversely related to the sound waves, then printing said photogram record
60 directly on a sensitized metallic coating carried by a temporary film strip to produce a series of transverse hardened metallic striations corresponding in magnetic permeability to the sounds as reflected in light images on the photogram strip, then adhesively attaching a permanent film strip to the hardened metallic striations, and subsequently removing the sensitized metallic coating not hardened by the printing step, and also removing the temporary film strip. 65

In testimony whereof I hereunto affix my signature in the presence of a witness. 70

HENRY C. BULLIS.

Witness:

EMORY L. GROFF. 75

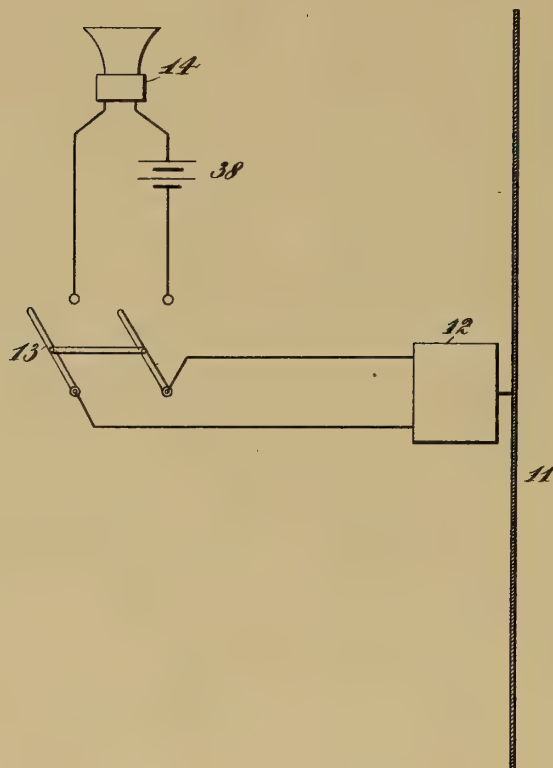
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents Washington, D. C."

APPARATUS FOR PHONOGRAPH KINETOSCOPES,
#1,213,176-----R.A.Fessenden,
Patented-January 23rd, 1917.
Filed-June 27th, 1916.

R. A. FESSENDEN.
APPARATUS FOR PHONOGRAPH KINETOSCOPES.
APPLICATION FILED JUNE 27, 1916.

1,213,176.

Patented Jan. 23, 1917.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR PHONOGRAPH-KINETOSCOPES.

1,213,176.

Specification of Letters Patent.

Patented Jan. 23, 1917.

Application filed June 27, 1916. Serial No. 106,247.

To all whom it may concern:

Be it known that I, REGINALD A. FESSENDEN, of Brookline, in the county of Norfolk and State of Massachusetts, a citizen of the United States, have invented a new and useful Improvement in Apparatus for Phonograph-Kinetoscopes, of which the following is a specification.

The methods and apparatus described herein relate to the production and transmission of sound, and more particularly to the transmission of sound, and especially speech and music, to large audiences; and more particularly speech, in connection with moving pictures and their visual display.

The drawing accompanying this specification shows diagrammatically apparatus for carrying out my invention.

In the figure, which is a diagrammatic side elevation of the apparatus, 12 is an electromagnetic mechanism adapted to operate as a sound producer, and preferably an oscillator of the type used by me for submarine telegraphy and telephony, and described in Letters Patent of the United States No. 1,167,866. 38 is a battery for furnishing current to the armature of the oscillator. 14 is a telephone transmitter and 13 is a switch. 11 is the diaphragm of the oscillator arranged to act, also, as a moving-picture screen. In operation the moving pictures are thrown on the screen 11 in the usual manner, and preferably on the side opposite to that on which the oscillator 12 is attached. When it is desired to produce sounds in connection with the pictures, the switch 13 is closed and the operator talks into the transmitter 14, thereby setting the oscillator 12 in action and causing the screen 11, which serves as its diaphragm, to vibrate and throw the sounds out toward the audience. In place of the telephone transmitter 14, any of the well-known equivalents may be used, such for example as the phonograph operated synchronously with the moving pictures, shown in

application for U. S. Patent Serial No. 685,699.

Heretofore in the practice of the art it has been customary, when sounds are to be transmitted to a large audience, to use a horn. The speech so reproduced has not been clear and distinct, but masked by overtones, so that the words were practically indistinguishable, and, moreover, the sound is unpleasantly loud close to the horn and weak at a distance from it. Moreover, when this method of transmitting sound has been used in connection with moving pictures, the source of sound is readily located and the sounds do not appear to proceed from the mouths of the images of the actors thrown on the screen. The present invention, in which the diaphragm of the sound-producing mechanism occupies a large area (in most moving-picture houses a large fraction of the cross-section of the hall), overcomes these disadvantages.

I have found by experiment that when the moving-picture screen is used to form the diaphragm of the sound-producing mechanism, the sound does not fall off with the distance, but is of substantially the same intensity in all parts of the hall, *i. e.*, that part of the audience at the back of the hall hears the sounds, music or speech at substantially the same intensity and with the same clearness that those near the screen do. Also, that the illusion is produced that the sounds actually come from the mouths of the images of the actors thrown on the screen.

What I claim as my invention is:—

1. A loud-speaking telephone having its diaphragm arranged as a kinetoscopic screen.

2. Means for producing sound in an inclosure adapted to contain an audience, comprising a loud speaking telephone having a diaphragm of the same order of dimensions as the cross section of said inclosure.

REGINALD A. FESSENDEN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PHONOGRAPH,
#1,213,197-----Newman H. Holland,
Patented-January 23rd, 1917.
Filed-Sept. 29th, 1913.

1,213,197.

Patented Jan. 23, 1917.

Fig. 1.

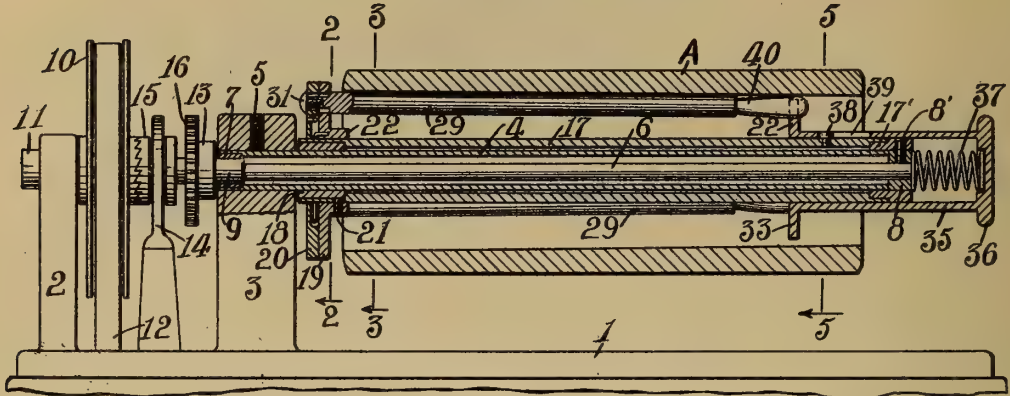


Fig. 2.

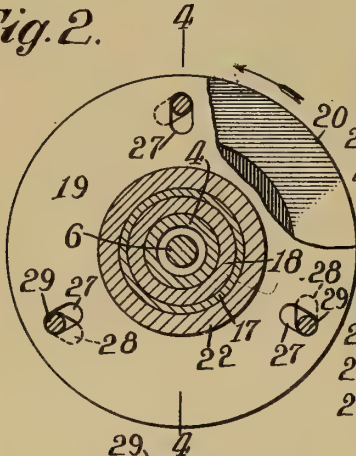


Fig. 4.

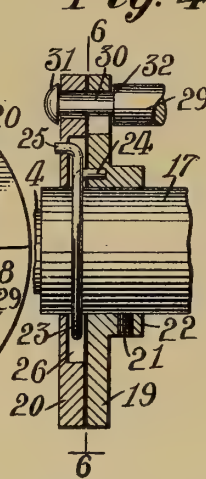


Fig. 3.

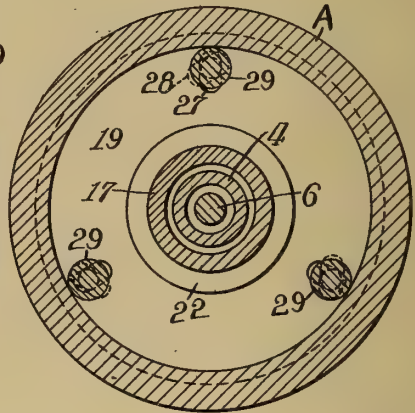


Fig. 5.

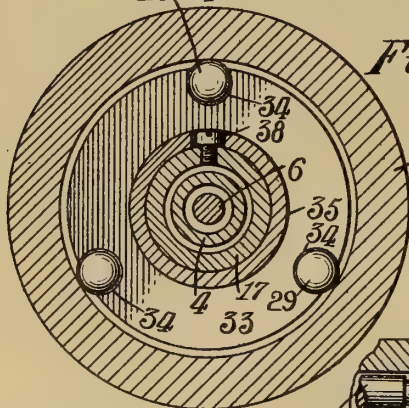


Fig. 7.

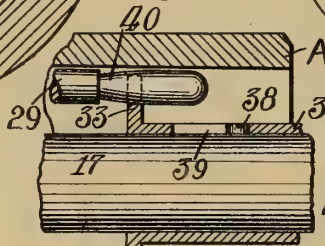
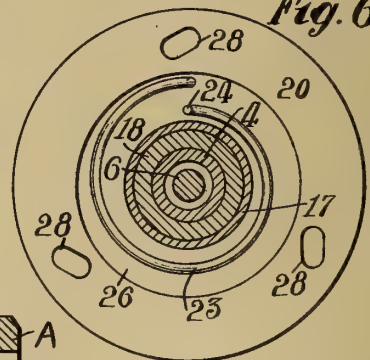


Fig. 6.



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PHONOGRAPH.

1,213,197.

Specification of Letters Patent.

Patented Jan. 23, 1917.

Application filed September 29, 1913. Serial No. 792,253.

To all whom it may concern:

Be it known that I, NEWMAN H. HOLLAND, a subject of the King of Great Britain, and a resident of West Orange, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Phonographs, of which the following is a description.

My invention relates to phonographs and more particularly to an improved sound record support therefor, and is an improvement on the invention disclosed in my co-pending application, Serial No. 653,155 filed October 6, 1911, and entitled phonographs and on which Patent No. 1,167,500 was granted on January 11, 1916.

Ordinary cylindrical phonograph records are provided with tapered bores but the diameters of these bores vary somewhat and also change to a considerable extent under different temperature conditions, whereas the supports upon which the records are usually mounted vary and change but little in diameter.

In using phonographs of the commercial type, it is very important, in transcribing, that the record should occupy the same relative longitudinal position with respect to its support, and the scale usually associated therewith, as it did when dictated, in order that the transcriber may quickly and correctly associate the instructions, which the dictator usually indicates on a memorandum sheet having a scale corresponding to the scale on the phonograph, with the proper parts of the dictated record and thereby experience no difficulty in carrying out such instructions in making a transcription of such record. However, owing to the variance and changing of the diameters of the records as described above, it frequently happens that the attempt to push these records to a predetermined position, on the supports therefor commonly employed, results in breaking the same.

The principal object of my invention is to provide an improved support for sound records which, while adapted to firmly hold the records, will permit the same to be always pushed thereon to a predetermined relative longitudinal position without breaking. In conformity with this object, I preferably provide a support in which the record engaging means is movable toward and away from the axis of the sup-

port, and in which means is provided tending to yieldingly maintain the said engaging means in the outermost position relative to the axis of the support, but which will permit inward movement thereof to allow the record, after the same has been pushed thereon to such an extent as to tightly engage said engaging means, to be pushed still farther onto the support.

A further object of my invention is to provide, in a support having the above characteristics, a construction whereby the support may be readily manipulated to permit a record to be readily removed therefrom without danger of damaging or breaking such record.

Other objects and features of my invention will appear more fully in the following description and appended claims.

For a clearer understanding of my invention, attention is hereby directed to the drawing accompanying and forming a part of the specification and in which—

Figure 1 is a front elevation partly in section of a phonograph embodying my invention; Fig. 2 is an enlarged sectional view on line 2—2 of Fig. 1, with a portion in back of the section plane broken away; Fig. 3 is an enlarged sectional view of the support on line 3—3 of Fig. 1, showing the relative positions of its parts when a record has been pushed thereon to a position beyond that shown in Fig. 1; Fig. 4 is a section on line 4—4 of Fig. 2, with parts shown in elevation; Fig. 5 is an enlarged sectional view, partly in elevation, on line 5—5 of Fig. 1; Fig. 6 is a sectional view on line 6—6 of Fig. 4, parts being omitted; and Fig. 7 is an enlarged fragmentary view of the support, as shown in Fig. 1, with the parts thereof in position to permit a record to be readily removed.

In all the views, corresponding parts are designated by the same reference characters.

The phonograph to which my invention is shown applied in Fig. 1, is of well known construction and comprises a bed plate 1 provided with standards 2 and 3. Supported at one end in the standard 3 is a stationary tube or sleeve 4 secured rigidly in position by a set screw or equivalent means 5. The driving shaft 6 for the phonograph is mounted to extend through the tube 4, the left hand end of the said shaft being provided with an enlargement 9 which is ro-

tatable within a bearing 7 in the corresponding end of the tube or sleeve 4.

Reference character 16 represents a gear, the hub 13 of which is suitably secured to the enlarged portion 9 of the shaft 6, and from this gear, by connections (not shown), the feed screw of the phonograph is driven in the usual manner. A collar or plug 8, suitably secured, as by a set screw 8' to the right hand end of the shaft 6, as shown in Fig. 1, engages the corresponding end of the tube 4 and coöperates with the hub 13 of gear 16, engaging the end of the bearing 7, to prevent the shaft 6 from shifting longitudinally with reference to the tube 4. Power is transmitted to the driving shaft of the phonograph by means of a belt 12 encircling the pulley 10 rotatable on the shaft 11, which latter is suitably secured in the standard 2 as by a set screw or equivalent means (not shown). Any suitable means (not shown) is employed to prevent movement of the pulley 10 axially of the shaft 11. The shaft 11 is axially in line with the shaft 6, and the pulley 10 thereon is adapted to be connected to shaft 6 by a clutch 15, which is slidable back and forth upon the enlarged portion 9 of the driving shaft 6. The movement of clutch 15 along the enlarged portion 9 of shaft 6 is controlled in the usual manner by means comprising a bell crank lever 14 loosely engaging the clutch.

My improved record support comprises a tubular shaft 17 secured at its opposite ends, as by friction, to bearings 17' and 18 whereby it is rotatably mounted upon the tube 4, bearing 17' being suitably secured, as by means of set screw 8', to the collar 8 so that the shaft 17 will rotate with the shaft 6.

Reference characters 19 and 20 represent a pair of adjacent flanges or disks mounted on the shaft 17 adjacent the inner or left hand end thereof, the disk 20 being loose on the shaft 17, and the disk 19 being secured thereto as by a set screw 21 passing through the collar 22, preferably formed integrally with disk 19. The disks 19 and 20 are preferably of the same diameter and are resiliently connected, preferably by means of a spiral spring 23 having bent ends 24 and 25 respectively engaging in recesses provided therefor in the respective flanges or disks 19 and 20. That face of disk 20 adjacent disk 19 is preferably provided with a depression or circular recess 26 within which the spring 23 is located, whereby the disks may be maintained in close proximity to each other, as shown in Fig. 4. The disk 19 is provided with a number of similar and equally spaced slots 27 and the disk 20 with a corresponding number of slots 28 of the same size as slots 27 and respectively coöperating there- with in a manner about to be set forth. The

outer walls of all the slots 27 and 28 are located at the same distance from the axis of shaft 6, the slots 27 being arranged radially of the axis of the support, while the slots 28 in disk 20 are preferably arranged at acute and equal angles to the slots 27, as clearly shown in Fig. 2.

Reference character 29 represents rods or members extending longitudinally of the shaft 17 and which are adapted to engage the bore of a cylindrical phonograph record A. Rods 29 are preferably cylindrical in form and correspond in number to the number of slots 27 or 28, the inner end of each of these rods being formed with a slightly reduced cylindrical portion 30 seated in a pair of coöperating slots 27 and 28 of disks 19 and 20. The reduced portions 30 are slightly less in diameter than the width of slots 27 and 28, whereby they may readily move therein during the manipulation of the support. Into the inner end of each rod 29 is threaded a screw 31, the head of which coöperates with the shoulder 32, formed on the rod 29 by the reduced portion 30, to maintain disk 20 closely adjacent disk 19 and at the same time to prevent substantial longitudinal movement of the rod 29 with respect to shaft 17. The reduced portions 30 of rods 29 are preferably slightly greater in length than the combined thickness of disks 19 and 20 so as to permit movement of the outer ends of the rods toward and away from the axis of shaft 6 about the inner ends thereof. Spring 23 is so arranged that, whenever the reduced end portions 30 of rods 29 are seated in the coöperating pairs of slots 27 and 28, it will be under tension and constantly tend to turn or rotate disk 20 on shaft 17 and with respect to disk 19 in the direction of the arrow in Fig. 2, and thus, by the co-action of the walls of the respective pairs of relatively angularly disposed slots 27 and 28 with such reduced portions 30, to maintain the inner ends of rods 29 in outermost position in engagement with the outer walls of the slots 27 and 28, as shown in Fig. 2. The portion of disk 19 between its outer circumference and a circle tangent to the outer walls of slots 27, about the axis of shaft 6 as a center, is substantially greater in width than the shoulders 22 of rods 29 and serves as an abutment against which the inner end of each record A should be pushed when applied to the support. Another flange or disk 33 is slidably mounted on the shaft 17 adjacent the outer end thereof and is provided with similar and equally spaced openings 34 arranged at equal distances from the axis of shaft 6 and corresponding in number to the slots 27 or 28. The inner walls of openings 34 are located slightly nearer to the axis of shaft 6 than those of slots 27. The outer ends of rods 29 each fits loosely in

one of the openings 34 in the disk or flange 33. As clearly shown in Fig. 5, the openings 34 extend through slightly more than a semi-circle so that the rods 29 are retained against disengagement laterally from the flange or disk 33 and at the same time extend slightly beyond the flange or disk so as to be adapted to engage the bore of the sound record. The openings 34 are slightly larger in diameter than the rods 29 so as to permit easy movement of the latter therein during the manipulation of the device. By reason of the location of the openings 34 nearer the axis of the support than the slots 27, the support formed by the rods 29 has a slight taper toward the outer end thereof. The flange or disk 33 is provided with a cup shaped portion or member 35 slidably mounted on the shaft 17, this cup shaped member being preferably provided with a head 36 to facilitate the operation thereof. A coiled spring 37, or other suitable resilient member, is located between the end of the bore of the cup shaped member 35 and the collar 8 and serves to hold the flange or disk 33 in its outer position, and thereby to retain the members 29 in firm engagement with the bore of the record A, as shown in Fig. 1. A screw 38, or other suitable guide, is secured to the shaft 17 and its head coöperates with a longitudinal slot 39 in the cup-shaped member 35 to hold the disk or flange 33 with its openings 34 in axial alinement with the slots 27 in the disk or flange 19. This screw also serves, by its engagement with the ends of the said slot, to limit the axial movement of the cup-shaped member 35 and thereby of flange or disk 33.

The relative location of the slots 27 in flange 19 and the openings 34 in the flange or disk 33 is such that, when the inner ends of rods 29 are substantially in engagement with the outer walls of slots 27 and the flange 33 is in its outer position, the taper of the support formed by rods 29 substantially conforms to the taper of the bore of the blank A, as shown in Fig. 1. Moreover, the support is so designed that, when the parts are in the position just described, the bore of a record placed thereon will tightly engage the rods 29 when the inner end of the record is still a slight distance from the disk 19, as shown in Fig. 1. It is evident that an inward pressure, sufficient to cause movement of the inner end of any of the rods 29 toward the axis of the support will, by reason of the engagement of the rods with the relatively inclined slots 27 and 28, cause rotation of the disk 20 with respect to disk 19 in a direction opposite the arrow shown in Fig. 2 and thereby cause a like movement of the rest of the rods 29. By reason of the radial arrangement of the slots 27 in disk 19, the inner ends of rods 29 are constrained to movement in a radial direction only with re-

spect to the axis of the support, upon the relative rotation of disks 19 and 20 and, as the slots 28 in disk 20 are located at equal distances from the axis of the support and are respectively inclined at equal angles with respect to the slots 27, the rods 29 will be caused to move simultaneously and uniformly toward or away from the axis of the support, according to the direction of such relative rotation.

In using my invention, a record A is placed upon the support by merely sliding the same along the rods 29 until it engages the same with sufficient firmness to be held thereon by friction. At this time, the record will occupy a position on the support corresponding to that shown in Fig. 1 with the bore of the record firmly in engagement with the rods 29 for substantially their entire length. The record A is now pushed still farther onto the support until the inner end thereof engages the disk 19, whereupon the inward pressure exerted by the walls of the larger end of the bore of the record will cause inward movement of the inner ends of the rods 29, which movement will be radial and uniform for all the rods by reason of the action of disks 19 and 20 and their slots 27 and 28 as above described. By reason of the action of spring 23, however, the rods 29 will be maintained in such firm engagement with the bore of the record A as to prevent relative rotation of the latter with respect to the support in the operation of the phonograph. It will, therefore, be apparent that the cylindrical records may be always pushed onto my improved support into engagement with the flange or disk 19 without any danger of breaking the same at the end where the bore is of greatest diameter and the material of the record is thinnest. If, however, the inner ends of rods 29 were maintained at a fixed distance from the axis of the support, the records would frequently be broken in attempting to force the same into engagement with the flange 19.

The sound records for which my improved support is designed are quite thick at that end where the diameter of the bore is smallest, and accordingly are strong enough at this end to prevent breaking thereof, by the outward pressure exerted thereon by the outer ends of rods 29 of my support, when pushed from the position shown in Fig. 1 into engagement with the flange or disk 19.

When it is desired to remove the record A from the support, it is simply necessary to force the cup shaped member 35 and thereby disk 33 inwardly toward flange 19 to the position shown in Fig. 7. Thereupon the disk or flange 33, by reason of the engagement of rods 29 with the openings 34 thereof, will cause the collapsing of the record support by moving the outer ends of rods 29 toward the axis of the support and thereby

sufficiently increase the taper of the support to remove the rods from tight engagement with the bore of record A and permit the latter to be easily removed by hand, even though previous to the collapsing of the support, the record may have been securely shrunk or clamped thereon. I preferably taper the rods 29, as shown at 40, over the portions adapted to be engaged by the flange or disk 33, whereby the amount of inward or outward movement of the rods 29 for a given amount of longitudinal shifting of the flange 33 is materially increased.

It is to be understood, of course, that my improved support is equally adapted for sound records and sound record blanks, and that, in the accompanying claims, the term "record" is intended to include both a sound record and a sound record blank, while the term "records" is intended to include both sound records and sound record blanks.

While I have shown and specifically described the preferred embodiment of my invention, it is to be understood, of course, that many modifications in the construction and arrangement thereof may be made without any departure from the spirit of my invention and the scope of the appended claims.

Having now described my invention, what I claim as new and desire to protect by Letters Patent of the United States is as follows:

1. In a support for sound records, the combination of a rotatable member, a record engaging member, and a device resiliently connected to said rotatable member for rotary movement with respect thereto and coacting therewith when turned with respect thereto in either direction to positively change the position of said record engaging member with respect to the axis of the support, substantially as described.

2. In a support for sound records, the combination of a member adapted to engage the bore of a record, a device coacting with said member adjacent one end thereof and operable to positively move said member at such end either toward or away from the axis of the support, and means operable independently of said device and coacting with said member adjacent the other end thereof to change the inclination of said member with respect to the axis of the support, substantially as described.

3. In a support for sound records, the combination with a plurality of record engaging members, of means comprising a plurality of relatively rotatable members adapted by their relative rotation in either direction to positively change the relative position of said record engaging members, substantially as described.

4. In a support for sound records, the

combination with a plurality of record engaging members, of means comprising a pair of positively and resiliently connected relatively rotatable members adapted by their relative rotation in either direction to change the relative position of said record engaging members, substantially as described.

5. In a phonograph, the combination with a shaft, of a plurality of record engaging members extending longitudinally thereof, and supporting means for said members comprising a plurality of relatively rotatable members adapted by their relative rotation in either direction to positively change the inclination of said record engaging members with respect to said shaft, substantially as described.

6. In a phonograph, the combination with a shaft, of a plurality of record engaging members extending longitudinally thereof, and means comprising a member capable of rotary movement with respect to said shaft and adapted by such rotary movement in either direction to positively change the position of said record engaging members with respect to the shaft, substantially as described.

7. In a phonograph, the combination with a shaft, of a plurality of record engaging members extending longitudinally thereof, and supporting means for said record engaging members comprising a pair of members having a resilient connection, one of said pair of members being fast on said shaft and the other being loose thereon, said pair of members being adapted by relative angular movement thereof in either direction to positively change the relative position of said record engaging members, substantially as described.

8. In a support for sound records, the combination of a record engaging member, and supporting means for said member comprising a pair of independently operable devices adapted to coact with said member adjacent its ends respectively to positively move said member at its ends either toward or away from the axis of the support, substantially as described.

9. In a support for sound records, a plurality of record engaging members, and supporting means for said members comprising a plurality of relatively rotatable members in engagement therewith, said relatively rotatable members being provided with means whereby movement of any of said record engaging members either toward or from the axis of the support will positively cause relative rotation of said relatively rotatable members and thereby effect a similar movement of the rest of said record engaging members, substantially as described.

10. In a phonograph, the combination with a shaft, a plurality of longitudinally ex-

tending record engaging members, and supporting means for said members comprising a pair of members, one of which is fast on said shaft and the other of which is loose on said shaft and resiliently connected to the fast member, said pair of members being provided with a plurality of pairs of coacting slots respectively engaged by said record engaging members, the slots of each pair being relatively inclined, whereby relative rotation of said pair of members will effect the simultaneous movement of said record engaging members toward or away from said shaft, substantially as described.

11. In a phonograph, the combination with a shaft, of a plurality of record engaging members extending longitudinally thereof, and supporting means for said members comprising a plurality of relatively rotatable members provided with means whereby such members will, upon their relative rotation, positively change the relative position of said record engaging members and whereby movement of any of said record engaging members either toward or from said shaft will positively cause relative rotation of the relatively rotatable members, substantially as described.

12. In a phonograph, the combination with a shaft, of a plurality of record engaging members extending longitudinally thereof, and supporting means for said members comprising a pair of relatively rotatable members provided with means comprising a plurality of pairs of relatively inclined slots respectively coacting with said record engaging members, whereby the relative rotation of said pair of members will effect a change in the relative position of said record engaging members and whereby movement of any of said record engaging members toward or from said shaft will cause relative rotation of the relatively rotatable members, substantially as described.

13. In a phonograph, the combination with a shaft, of a plurality of record engaging members extending longitudinally thereof,

supporting means for said members comprising a pair of relatively rotatable members provided with means comprising a plurality of pairs of relatively inclined slots respectively coacting with said record engaging members, whereby the relative rotation of said pair of members will effect a change in the relative position of said record engaging members and whereby movement of any of said record engaging members toward or from said shaft will cause relative rotation of the relatively rotatable members, and resilient means constantly tending to maintain said relatively rotatable members in a predetermined relative position, substantially as described.

14. In a support for sound records, the combination with a record engaging member, of a pair of relatively rotatable members adapted by their relative rotation in either direction to positively move the record engaging member with respect to the axis of the support, substantially as described.

15. In a support for sound records, the combination with a record engaging member, of a pair of adjacent and relatively rotatable members which coact to form a support for the record engaging member at one end thereof and which are adapted by their relative rotation to move said record engaging member with respect to the axis of the support, substantially as described.

16. In a support for sound records, the combination with a record engaging member, of a pair of relatively rotatable members adapted by their relative rotation in one direction to positively move the record engaging member toward the axis of the support, substantially as described.

This specification signed and witnessed this 26th day of Sept., 1913.

NEWMAN H. HOLLAND.

Witnesses:

WILLIAM A. HARDY,
FREDERICK BACHMANN.

PHONOGRAPH,
#1,213,413-----Clinton B. Repp,
Patented-January 23rd, 1917.
Filed-January 19th, 1912.

C. B. REPP.
PHONOGRAPH.

APPLICATION FILED JAN. 19, 1912.

1,213,413.

Patented Jan. 23, 1917.

3 SHEETS—SHEET 1.

Fig. 1.

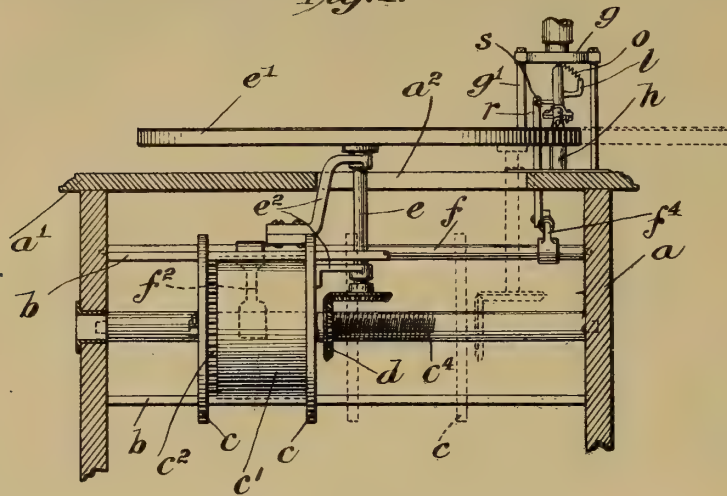
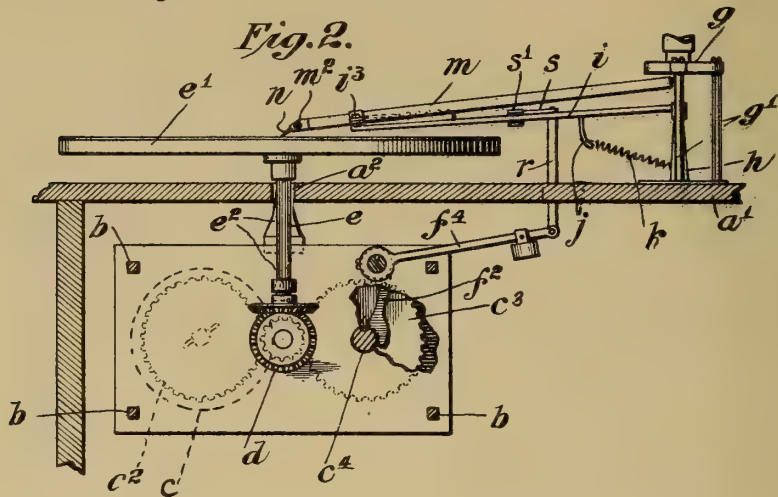


Fig. 2.



Attest:

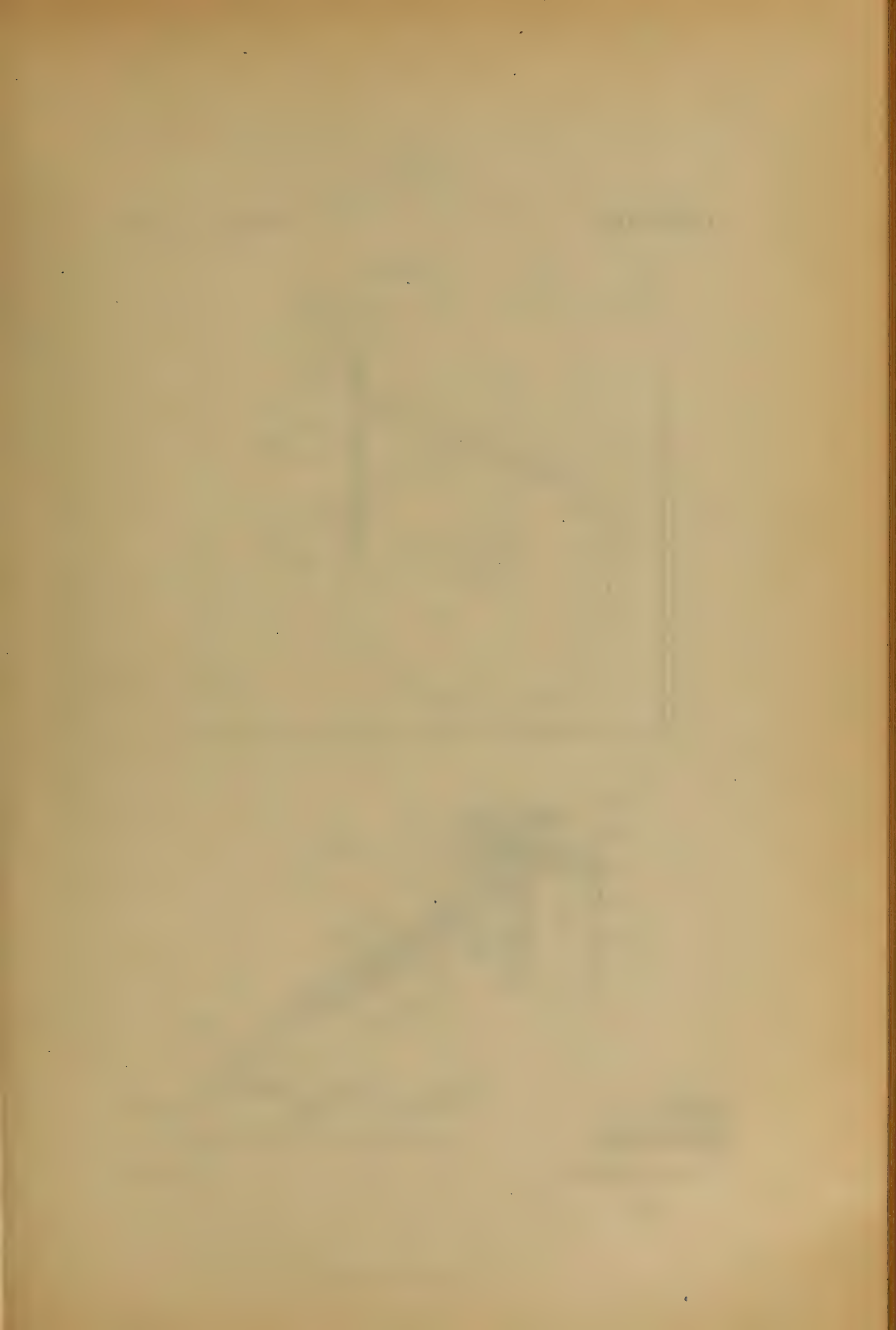
E. M. Wening
Eugene Wening.

Clinton B. Repp

by *Graus P. Wentworth*

Inventor:

his Atty.



C. B. REPP.
 PHONOGRAPH.
 APPLICATION FILED JAN. 19, 1912.

1,213,413.

Patented Jan. 23, 1917.
 3 SHEETS—SHEET 2.

Fig. 3.

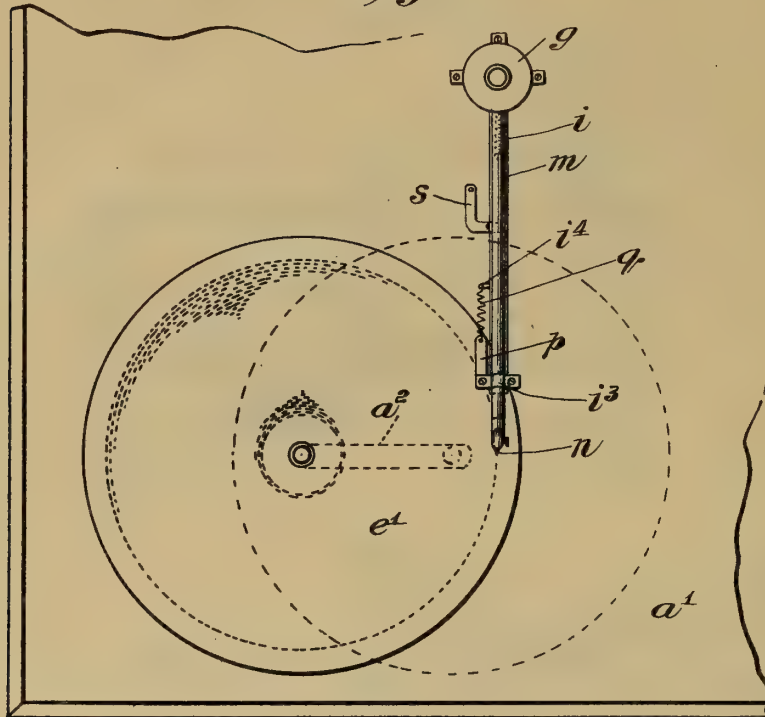
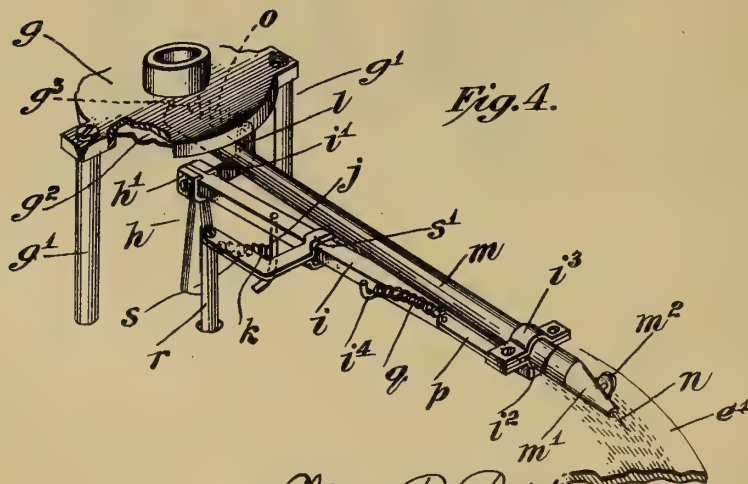


Fig. 4.



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 by *Charles P. Westworth*
 his Atty.



1,213,413.

Patented Jan. 23, 1917.
 3 SHEETS—SHEET 3.

Fig. 5.

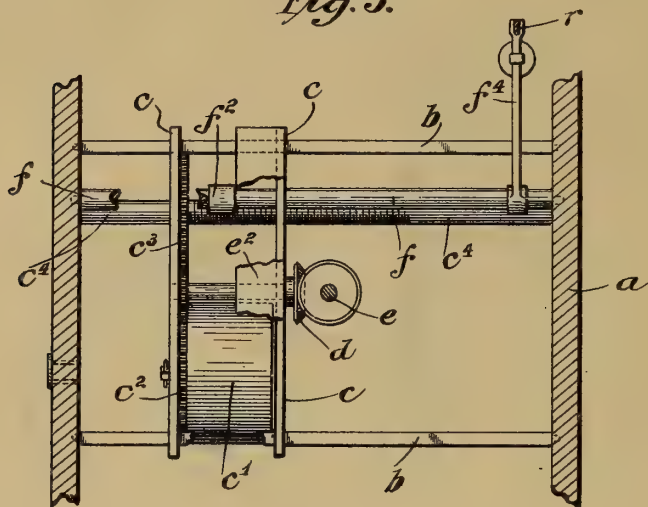


Fig. 6.

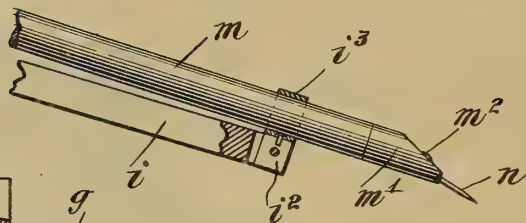
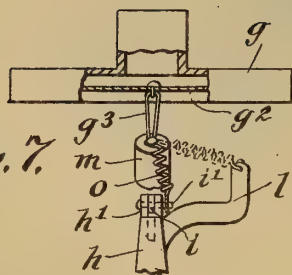


Fig. 7.



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 his Atty.

UNITED STATES PATENT OFFICE.

CLINTON B. REPP, OF NEW YORK, N. Y.

PHONOGRAPH.

1,213,413.

Specification of Letters Patent.

Patented Jan. 23, 1917.

Application filed January 19, 1912. Serial No. 672,067.

To all whom it may concern:

Be it known that I, CLINTON B. REPP, a citizen of the United States, residing at the borough of Manhattan, in the city, county, and State of New York, have invented certain new and useful Improvements in Phonographs, of which the following is a specification, reference being had therein to the accompanying drawings, which form a part thereof.

My invention relates to phonographs, and more particularly to a type of phonograph patented to me in and by Letters Patent of the United States No. 1,003,655, of September 19, 1911, wherein the sound vibrations are transmitted to a stationary diaphragm through a non-oscillatory transmitter arm.

The main object of my invention is to provide a phonograph of this character adapted to be adjusted for use with either a gramophone or a graphophone record.

A further object is to provide a phonograph wherein the transmitter arm is supported by a supplemental arm, and independent means are provided for developing pressure upon the diaphragm through the transmitter arm, and for bringing the stylus point into the desired relation to, and intimate contact with, the record.

A still further object is to provide a phonograph wherein the desired pressure upon the diaphragm will be developed in a manner which will permit this pressure to be applied either substantially axially of the diaphragm, or at an angle to its axis, in order to facilitate the adjustment of the instrument to use with either gramophone or graphophone records.

A still further object is to provide a phonograph wherein the sound vibrations are transmitted to a stationary diaphragm through a non-oscillatory transmitter member, and wherein said transmitter member will be held substantially stationary, the record having movement relative thereto to bring every portion of the record within, and into the operative relation to, the stylus carried by the transmitter arm.

A still further object is to provide a phonograph employing a substantially fixed stylus point and a traveling record support adapted to have movement relative to the stylus, wherein sufficient play will be afforded in the stylus support to compensate for any irregularities in the record or any lack

of uniformity in the feed of the traveling record support.

A still further object is to provide in a machine of the character immediately above referred to, means whereby as the stylus is raised from the record such movement will simultaneously render the record feeding mechanism inoperative so as to permit the return of said record to the starting position.

A still further object is to provide a clutch device controlling mechanism for the record feeding mechanism which will be operative at any point in the movement of the said mechanism, and which when the stylus point is placed upon the record, will automatically render the clutch device of the record feeding mechanism operative. And a still further object is to provide a structure of this kind, which will be simple in design, reliable in its operation, and inexpensive to produce.

The invention consists primarily in a phonograph, embodying therein a rotary record support, a fixed amplifier, a substantially stationary transmitter arm connected with said diaphragm and carrying a stylus point, and means for causing said record support to have lineal traverse relatively to said stylus; and in such other novel features of construction and combination of parts as are hereinafter set forth and described, and more particularly pointed out in the claims hereto appended.

Referring to the drawings:—Figure 1 is a vertical section of a phonograph embodying my invention; Fig. 2 is a vertical section transversely of the line of movement of the motor frame; Fig. 3 is a plan view thereof; Fig. 4 is a detail view in perspective of the transmitter mechanism and the sound box; Fig. 5 is a horizontal section showing the motor and the parts appurtenant thereto; Fig. 6 is a detail view of the connection between the rigid supporting arm and the transmitter arm; and Fig. 7 is a detail view of the structure for applying a tensional stress to the diaphragm.

Like letters refer to like parts throughout the several views.

In the embodiment of my invention shown in the drawings, *a* indicates a frame carried by a cabinet having a top slab *a'* thereon. Carried by the said frame is a plurality of guide rods *b* upon which are mounted the plates *c* of a spring motor of

any desired construction, which is shown merely conventionally in the accompanying drawings.

Included in the motor is a spring drum c' carrying the first gear c^2 of a train of gears, the last gear c^3 of which train is splined upon a feed screw c^4 journaled in the frame a . By this means the entire motor is permitted to travel within the cabinet while at the same time rotating the feed screw c^4 irrespective of the position of the motor relative thereto. Also driven from the same gear train is a beveled gear d , enmeshed with a beveled gear upon the vertical shaft e having mounted thereon, so as to be rotatable therewith, the record supporting table e' , which in the form of the invention shown occupies a horizontal position. To secure the desired stability of the said table, I provide brackets e^2 having bearings in which the shaft e is mounted adjacent to the opposite ends thereof. The cabinet top has a slot a^2 therein, through which the shaft e projects, said slot being of a length sufficient to admit of a feeding movement approximating the radius of the table e' .

Mounted in the cabinet adjacent to the feed screw c^4 , is a rock shaft f having splined thereto an arm, mounted upon and movable with the motor frame, said arm carrying a nut f^2 adapted to engage the said feed screw. Keyed to said shaft is a weighted arm f^4 adapted to normally force said nut f^2 into engagement with said feed screw c^4 , thus positioning these parts so that with the rotation of said feed screw c^4 the entire motor and the record table will travel radially of the latter. This construction is employed in order to permit the nut to be thrown into and out of gear with the feed screw at any point of the travel of said table in order to permit the adjustment of the record, or the stoppage of the machine, in a manner which will be hereinafter referred to.

Mounted upon the top slab a' at a point thereof without the range of movement of the table e' , is a sound box, g , the supporting means for which comprises a plurality of standards g' . This construction results in a sound box occupying a fixed position. Within the sound box g is a diaphragm g^2 , the detailed construction of these parts being that now commonly employed, or any other desired construction that may be satisfactorily employed.

Secured to the top slab a' axially below the diaphragm g^2 , is a post h having on the top thereof a yoke h' , the axis of which yoke extends vertically and coincides with that of the diaphragm. Mounted in the yoke h' by means of a horizontal pivot i' , is a supporting arm i preferably of metal, the pivot i' connecting said arm with said yoke projecting beyond said yoke so as to constitute

a stud to be utilized in effecting the adjustments of the instrument for use with graphophone records. The arm i projects substantially radially of the diaphragm g^2 toward and over the record table e' , and the outer end thereof carries a universal joint i^2 carrying a split collar i^3 adapted to receive and engage the outer end of the transmitter arm. Projecting downwardly from the said arm i , adjacent to the post h , is a post j , and extending from said post j and secured to the post h is a coiled spring k , adapted to exert a downward pressure upon said arm for the purpose of developing the desired pressure of the stylus point upon the record carried by the table e' . Also carried by the arm i is an upwardly projecting extension l directly beneath and terminating adjacent to the diaphragm, said extension being adapted for use in adjusting the instrument for use in connection with gramophone records.

The means for conveying the sound vibrations indicated upon the record to the diaphragm, comprise a transmitter arm m preferably of wood, which is firmly secured in position within the split collar i^3 adjacent to that end thereof carrying a mount m' adapted to receive the stylus point n . This stylus point is secured within said mount by means of the set screw m^2 . The other end of said transmitter arm is connected to the diaphragm g^2 by means of a flexible loop g^3 carried by said diaphragm and attached to said transmitter arm in the manner described in my patent above referred to. Secured to the end of said transmitter arm adjacent to the diaphragm is a small coiled spring o the free end of which is provided with a loop adapted to pass over the protruding end of the pivot i' or of the extension l , according to whether it is desired to use the instrument in connection with graphophone or gramophone records.

While the action of the spring k will tend to develop the desired pressure upon the diaphragm to place the loop connection in tension, to provide independent means for increasing this pressure, I mount upon the split collar i^3 a spring extension p between which and the hook i^4 upon the arm i is a coiled spring q adapted to exert a torque upon the universal joint i^2 to place the diaphragm under sufficient tension, the spring o supplementing the action of the spring q and controlling the direction of the application of pressure.

The arm i is capable of a very limited movement in the yoke h' , this movement being merely that necessary to permit sufficient play of the outer end of said arm and of the stylus point n to compensate for irregularities in the indicated sound waves upon the record and inequality in the feeding movement of the record, caused by lost

motion in the feed screw c^4 . A movement equal to the width of eight or ten sound wave grooves is sufficient to eliminate all imperfections in the reproduction due to such irregularities, thus requiring but very little play at the point of support of the said arm i .

In order to place the feeding or traveling of the motor under the control of the transmitter arm m , and its supporting arm i , I secure to the arm f^4 a connection rod r carrying an angular plate s having a forked end s' adapted to straddle the said arm i in a manner to cause the raising or lowering of said arm to oscillate the shaft f to throw the nut f^2 out of engagement with the feed screw c^4 or permit it to drop into such engagement. Thus, it will be observed, as the stylus is raised from the record, the feeding movement of the record table e' will instantly cease, and the motor driving said table will be freed so as to permit said table to be restored to its normal position where the edge thereof will be directly beneath the stylus point, or permit the adjustment of said plate to bring the stylus point into engagement with the grooves containing the indicated sound vibrations upon the record.

The operation of the herein described phonograph is substantially as follows:—Inasmuch as the details of the motor are old and well known in this art, the showing of this motor and the description thereof is merely conventional, it being assumed that the motor is so constructed as to cause a rotation of the various parts at a predetermined rate of speed.

When it is desired to start the motor, the transmitter arm m is raised, carrying with it the supporting metallic arm i , which raises the rod r and the arm f^4 , thus oscillating the shaft f . This movement of the shaft disconnects the nut f^2 from the feed screw c^4 , permitting the entire motor to be moved relative to the said transmitter arm by means of the record table e' . When the record upon the table e' is in a position where the stylus n will properly engage the groove upon the upper surface thereof, the said transmitter arm is lowered, reversing the movement of the nut f^2 and throwing it into engagement with the feed screw c^4 so that when the motor is started, the rotation of said screw will cause said nut to travel along it. This movement of the said nut will impart a lineal traverse to the motor and to the table e' in a manner to bring every portion of one radius of said record within the operative range of the said transmitter arm and stylus. The pitch of the feed screw c^4 will be such as to correspond with that of the spiral groove upon the record, the slight play of the transmitter arm m described above compensating for any differences in pitch between that of the screw

and that of the groove of the record. As the motor is thus caused to travel beneath the top slab a' , the shaft e will be simultaneously rotated to impart the desired rotary movement to the record so that while the stylus remains substantially stationary, the record has movement relative thereto. As the stylus is brought into engagement with the record, the springs developing the desired pressure between the stylus and the record, supplemented by the weight upon the arm f^4 , will bring the nut into mesh with the screw and will preserve the proper relation between these parts. As the record thus travels lineally toward, and rotates beneath, the stylus n , the horizontal pivots i' of the arm i will permit said arm and the transmitter arm m to rise and fall with the irregularities in the movement of the table e' , the arm m moving about an axis coinciding with its point of connection with the flexible loop g^3 connecting it with the diaphragm g^2 . There is no pivotal movement of the collar i^3 , the arm m with the exception of the slight lateral play above referred to, having movement only upon the said loop g^3 . As the record moves in relation to the stylus, the sound waves indicated thereon will develop in the transmitter arm vibrations corresponding in frequency with those indicated upon the record, which vibrations will pass to the diaphragm and produce sound waves in the manner described in my patent hereinbefore referred to. The said diaphragm is always in tension from the springs k and q , the action of these springs tending to exert a pull upon the diaphragm in a direction slightly obliquely of the axis thereof so that when no supplemental means are used, the instrument will reproduce sound from either a graphophone or a gramophone record. To increase the amplitude of the reproduction, however, I provide the adjustment spring o which increases the tension upon the diaphragm and gives a more definite direction to the stress occurring thereon. When, for example, the spring o is drawn down and secured to the protruding end of the pivot i' , a substantially vertical pressure results, while if this spring be drawn at an angle to the axis of the diaphragm, and secured to the upwardly projecting extension l , the lateral pressures will be increased to adapt it for use with a gramophone record.

The universal bearing for the collar i^3 is solely for the purpose of permitting the movement of the transmitter arm m for accomplishing the adjustment above referred to.

The arms of the forked end s' of the plate s straddle the arm i and are spaced apart sufficiently so that when the nut f^2 is in engagement with the feed screws c^4 neither of said arms will be in engagement with the

arm; an arrangement which I use so as to prevent the development of any vibrations in said plate through its contact with said arm, or the transmission of vibrations from the feeding mechanism to the sound reproducing mechanism.

It is not my intention to broadly claim in this application the metallic arm supporting the outer end of the transmitter arm, nor the universal joint connecting these two arms; nor is it my intention to claim broadly a machine employing a transmitter arm of the character described provided with means for varying the direction of the application of pressure upon the diaphragm, such being subject matter of other applications of mine, pending concurrently herewith.

I believe it to be broadly new however, to incorporate in a machine of this character a support for a record, a stationary transmitter arm having no pivotal movement about bearings intermediate its ends, and means for imparting simultaneously lineal and rotary movement to said record support, and I intend to claim such broadly.

Having described my invention, what I claim as new and desire to have protected by Letters Patent, is:—

1. A phonograph embodying therein a fixed amplifier, a transmitter arm, one end of which is adapted to carry a stylus point, means connecting the other end thereof with, and adapted to transmit vibrations from said arm to, said amplifier, a rigid supporting arm for said transmitter arm, one end of which is connected to said transmitter arm adjacent that end thereof adapted to carry the stylus point, means supporting the other end of said arm and holding it against lateral movement while permitting vertical movement, a record support, and means causing said record support to have lineal traverse relatively to a stylus carried by said arm, and to have simultaneous rotary movement.

2. A phonograph embodying therein a fixed amplifier, a transmitter arm, one end of which is adapted to carry a stylus point, means connecting the other end thereof with, and adapted to transmit vibrations from said arm to, said amplifier, a rigid supporting arm for said transmitter arm, one end of which is connected to said transmitter arm adjacent that end thereof adapted to carry the stylus point, means supporting the other end of said arm and holding it against lateral movement while permitting vertical movement, a record support, means causing said record support to have lineal traverse relatively to a stylus carried by said arm, and to have simultaneous rotary movement, and means adapted to place said amplifier under tension through the connecting means between said transmitter arm and said amplifier.

3. A phonograph, embodying therein a rotary record support, a fixed amplifier, a substantially stationary transmitter arm, carrying a stylus point and adapted to be connected with and transmit vibrations to, said amplifier, means for causing said record support to have lineal traverse relatively to said stylus and to have simultaneous rotary movement, means adapted to place said amplifier under tension through the connection between said transmitter arm and said amplifier, and means whereby the direction of this pressure may be varied to adapt the machine for use in connection with either graphophone or gramophone records.

4. A phonograph, embodying therein a rotary record support, a fixed amplifier, a rigid supporting arm mounted upon horizontal pivots below said amplifier, said arm having slight lateral play, means exerting a downward pressure upon said arm, a substantially stationary transmitter arm attached adjacent to one end thereof to said supporting arm and having the other end thereof connected with, and adapted to transmit vibrations to, said amplifier, said transmitter arm being adapted to carry a stylus point, and means for causing said record support to have lineal traverse relatively to said stylus and to have simultaneous rotary movement.

5. A phonograph, embodying therein a rotary record support, a fixed amplifier, a rigid supporting arm mounted upon horizontal pivots below said amplifier, said arm having slight lateral play, means exerting a downward pressure upon said arm, a substantially stationary transmitter arm attached adjacent to one end thereof to said supporting arm and having the other end thereof connected with, and adapted to transmit vibrations to, said amplifier, said transmitter arm being adapted to carry a stylus point, means for causing said record support to have lineal traverse relatively to said stylus and to have simultaneous rotary movement, and means adapted to place said amplifier under tension through the connection between said transmitter arm and said amplifier.

6. A phonograph, embodying therein a rotary record support, a fixed amplifier, a rigid supporting arm mounted upon horizontal pivots below said amplifier, said arm having slight lateral play, means exerting a downward pressure upon said arm, a substantially stationary transmitter arm attached adjacent to one end thereof by a universal joint to said supporting arm and having the other end thereof connected with, and adapted to transmit vibrations to, said amplifier, said transmitter arm being adapted to carry a stylus point, means for causing said record support to have lineal traverse relatively to said stylus and

to have simultaneous rotary movement, and relatively movable cooperating means whereby a tensional stress may be applied to said amplifier and said transmitter arm may be shifted about said universal joint to vary the direction of the application of the stress tensioning said amplifier whereby the phonograph may be adjusted for use with either graphophone or gramophone records.

7. A phonograph embodying therein a fixed amplifier, a transmitter arm, one end of which is adapted to carry a stylus point, means connecting the other end of said arm with, and transmitting vibrations therefrom to, said amplifier, a feed screw, a frame adapted to receive lineal traverse from said feed screw, a rotary record support carried by said frame, a spring motor carried by said frame, means actuated by said motor for imparting a rotary movement to said record support simultaneously with the lineal traverse of said frame, and means preventing movement of said transmitter arm across the record by and in accordance with the indicated sound waves upon a record carried by said support.

8. A phonograph embodying therein a fixed amplifier, a transmitter arm, one end of which is adapted to carry a stylus point, means connecting the other end of said arm with, and transmitting vibrations therefrom to, said amplifier, a feed screw, a frame adapted to receive lineal traverse from said feed screw, a rotary record support carried by said frame, a spring motor carried by said frame, means actuated by said motor for imparting a rotary movement to said record support simultaneously with the lineal traverse of said frame, means preventing movement of said transmitter arm across the record by and in accordance with the indicated sound waves upon a record carried by said support, and means whereby said motor frame may be connected with and disconnected from said feed screw at will.

9. A phonograph, embodying therein a rotary record support, a fixed amplifier, a rigid supporting arm, mounted upon horizontal pivots below said amplifier, said arm having slight lateral play, means exerting a downward pressure upon said arm, a substantially stationary transmitter arm attached adjacent to one end thereof to said supporting arm and having the other end thereof connected with, and adapted to transmit vibrations to, said amplifier, said transmitter arm being adapted to carry a stylus point, a feed screw, a spring motor adapted to receive lineal traverse from said feed screw, a gear driven by said motor slidably mounted upon said feed screw, a nut carried by said motor, means actuated by said supporting arm whereby said nut may be thrown into or out of engagement with said screw, and means carried by said motor

for imparting a rotary movement to said record support simultaneously with the lineal traverse of the motor.

10. A phonograph, embodying therein a rotary record support, a fixed amplifier, a rigid supporting arm, mounted upon horizontal pivots below said amplifier, said arm having slight lateral play, means exerting a downward pressure upon said arm, a substantially stationary transmitter arm attached adjacent to one end thereof to said supporting arm and having the other end thereof connected with, and adapted to transmit vibrations to, said amplifier, said transmitter arm being adapted to carry a stylus point, a feed screw, a spring motor adapted to receive lineal traverse from said feed screw, a gear driven by said motor slidably mounted upon said feed screw, a nut carried by said motor, and slidably mounted upon a rocking shaft, an arm carried by said shaft, a rod secured to said arm and adapted to straddle said supporting arm, whereby said nut may be thrown into or out of engagement with said screw as said supporting arm is lowered or raised to engage the stylus with, or disengage it from, the record, and means carried by said motor for imparting a rotary movement to said record support simultaneously with the lineal traverse of the motor.

11. A phonograph embodying therein a record support, means actuating said support, a fixed sound box, a diaphragm mounted therein, a transmitter arm adapted to carry a stylus point at one end thereof, a flexible connection between the other end of said arm and said diaphragm, a rigid supporting arm adapted to have said transmitter arm mounted thereon adjacent to the stylus, a universal joint connecting said transmitter arm and said supporting arm, means acting through said supporting arm whereby said transmitter arm is normally forced toward a record, projections substantially axially below said diaphragm and below and eccentrically thereof, and an elastic member, one end of which acts upon said connection between the transmitter arm and the diaphragm, and the other end of which is adapted to be connected to either of said projections to adjust the machine for use with a graphophone or a gramophone record.

12. A phonograph, embodying therein a record support, means actuating said support, a fixed sound box, a diaphragm mounted therein, a transmitter arm adapted to carry a stylus point at one end thereof, a flexible connection between the other end of said arm and said diaphragm, a rigid supporting arm adapted to have said transmitter arm mounted thereon adjacent to the stylus, a pivotal connection between said transmitter arm and said supporting arm, means acting through said supporting arm

whereby said transmitter arm is normally forced toward a record, a spring member carried by said pivotal connection, and an elastic member extending from said spring
5 member downwardly to said supporting arm, whereby a rotative movement is exerted upon said pivotal connection to develop pressure upon said diaphragm.

In witness whereof, I have hereunto affixed my signature in the presence of two subscribing witnesses, this 8th day of January, 1912.

CLINTON B. REPP.

Witnesses:

FRANK T. WENTWORTH,
EUGENE WENING.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

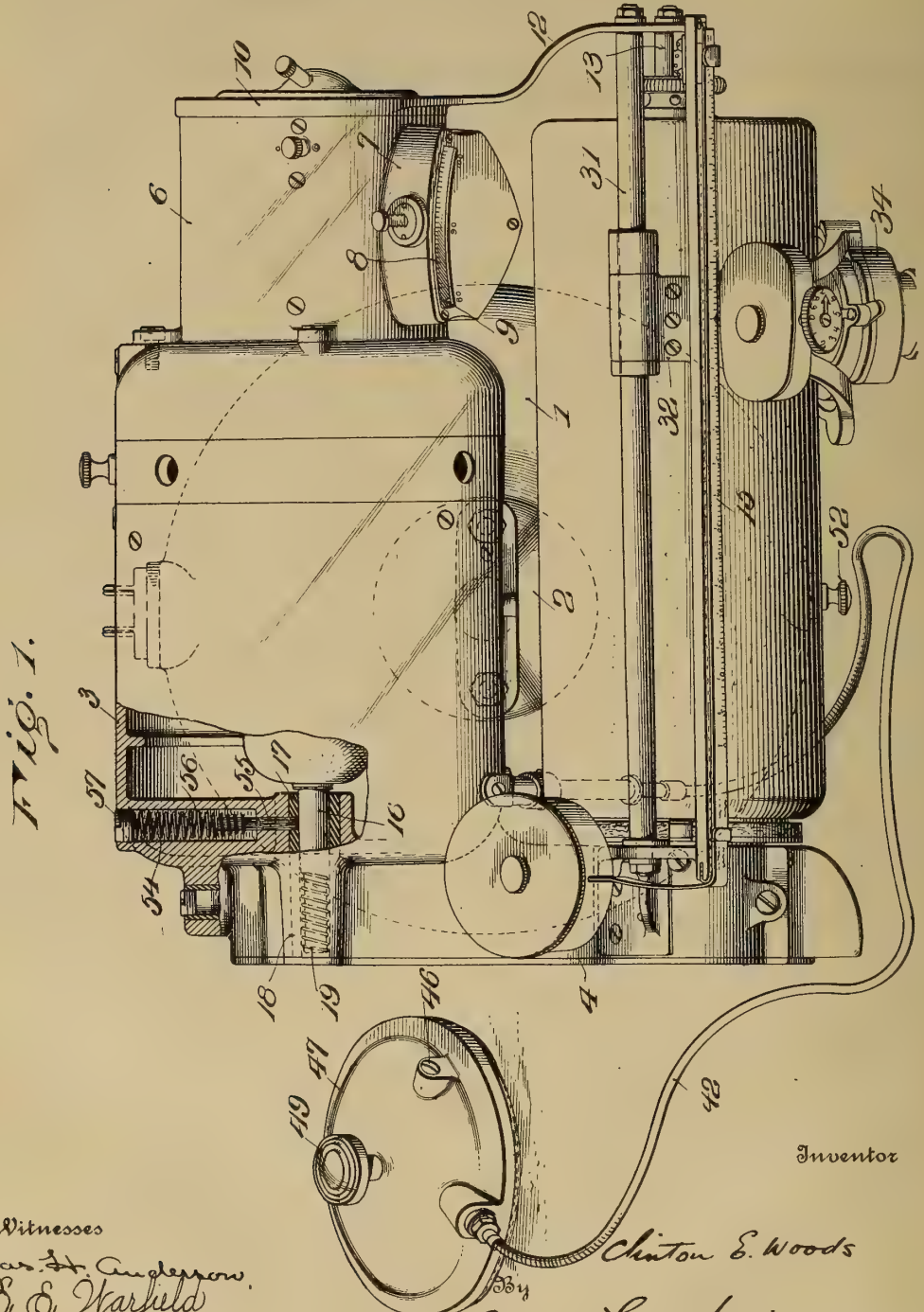
TALKING MACHINE,
#1,213,443-----Clinton E. Woods,
Patented-January 23rd, 1917.
Filed-Sept. 25th, 1913.

(Assigned to the American Graphophone Co., Corp. of
West Virginia)

C. E. WOODS.
TALKING MACHINE.
APPLICATION FILED SEPT. 25, 1913.

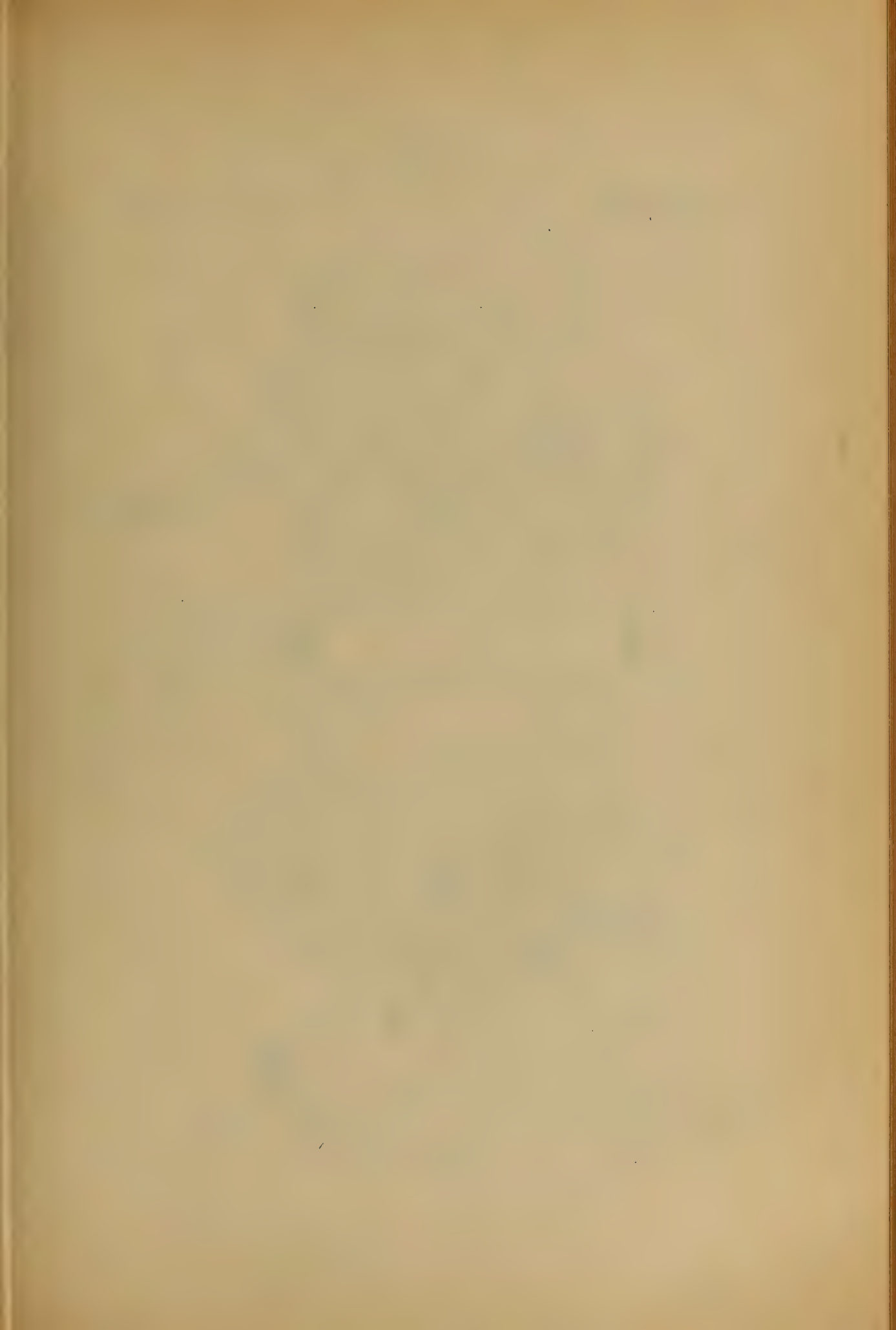
1,213,443.

Patented Jan. 23, 1917.
4 SHEETS—SHEET 1.



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TALKING MACHINE.
APPLICATION FILED SEPT. 25, 1913.

1,213,443.

Patented Jan. 23, 1917.
4 SHEETS—SHEET 2.

Fig. 2.

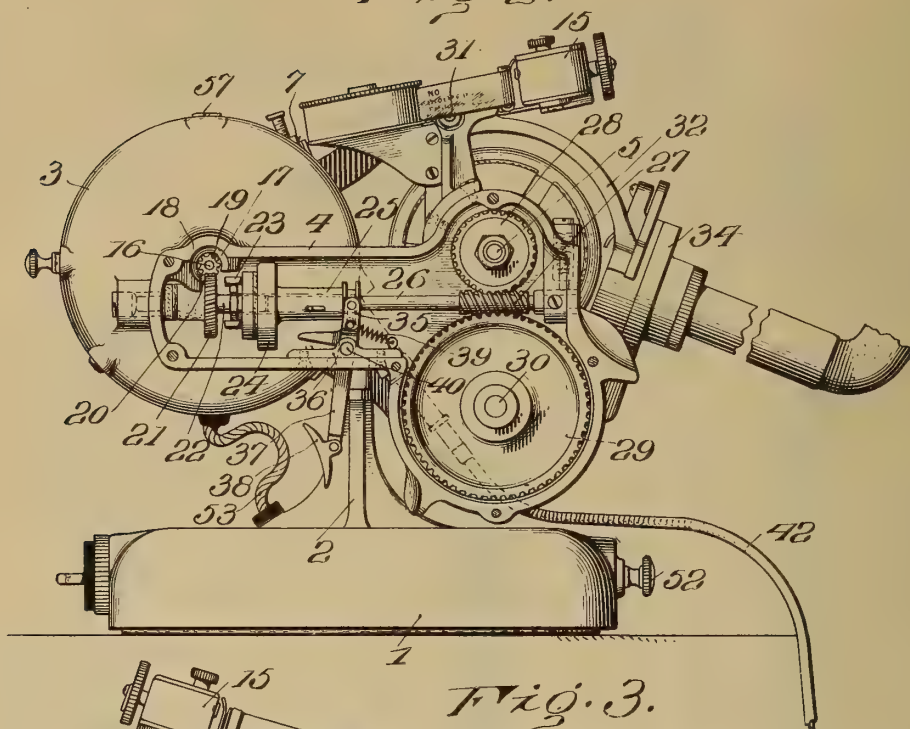
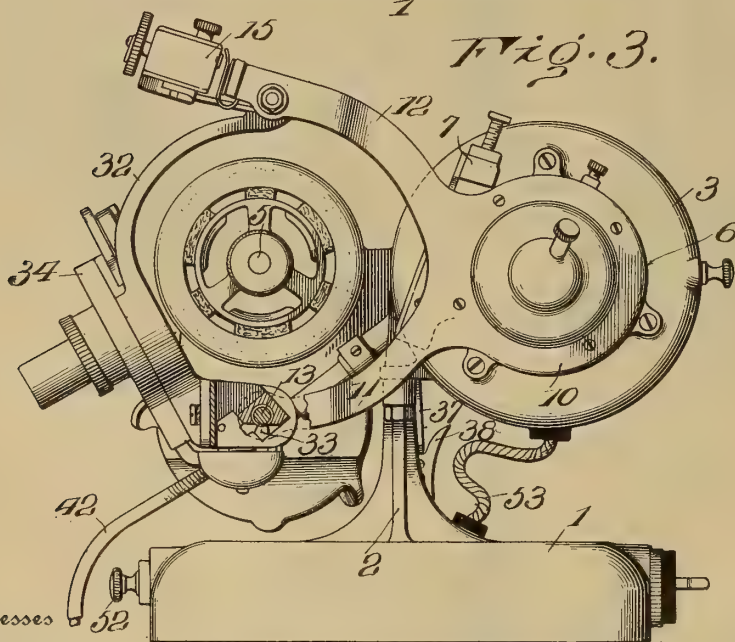


Fig. 3.



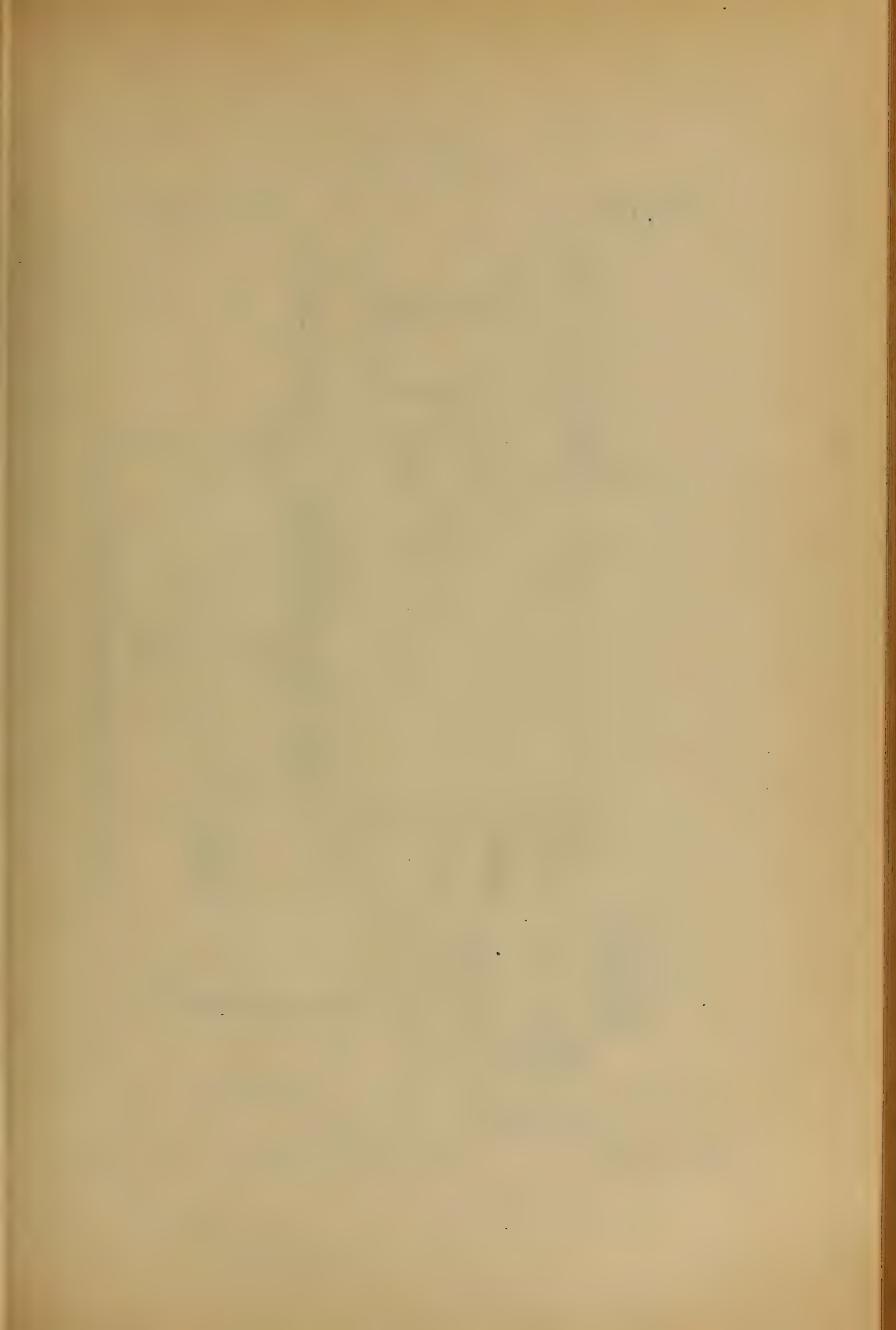
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Attorneys



C. E. WOODS.
TALKING MACHINE.
APPLICATION FILED SEPT. 25, 1913.

1,213,443.

Patented Jan. 23, 1917.

4 SHEETS—SHEET 3.

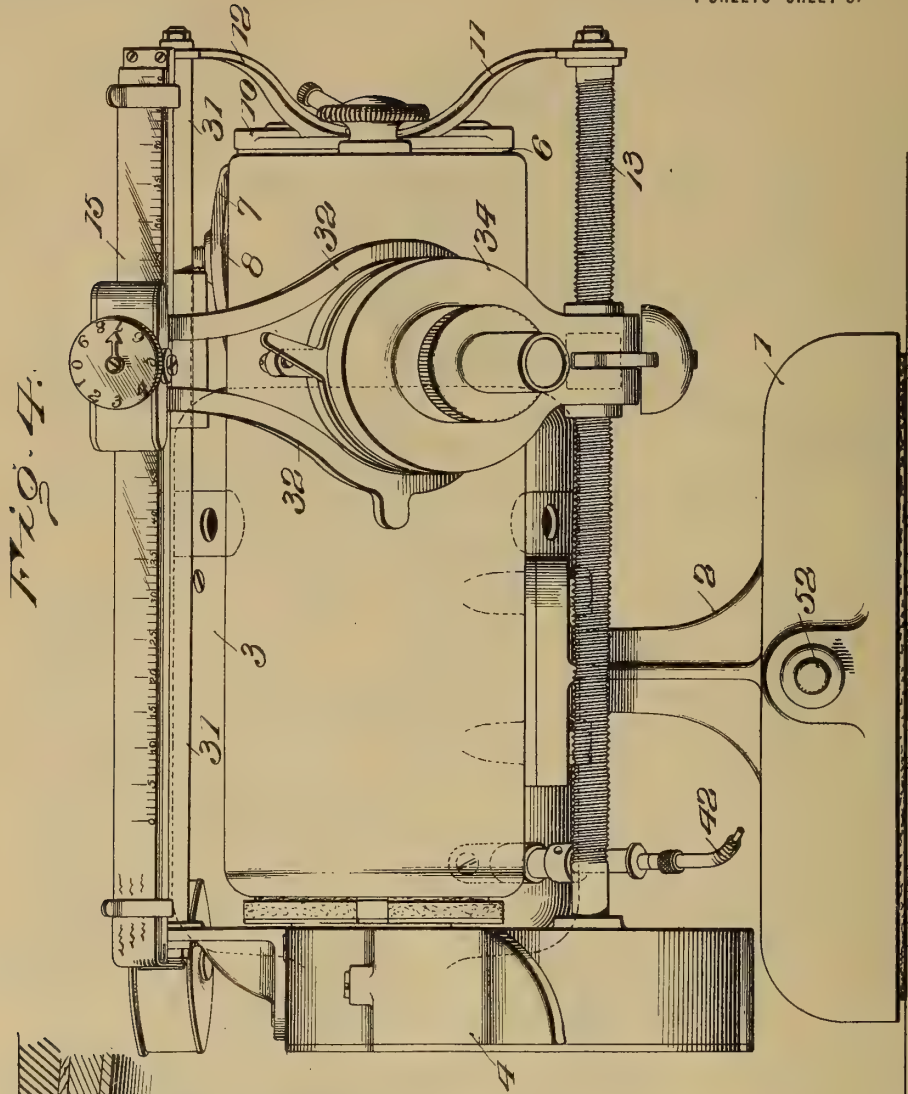


Fig. 4.

Fig. 8.

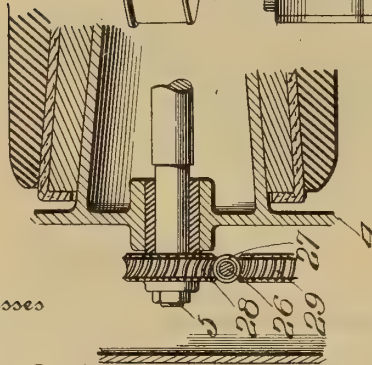
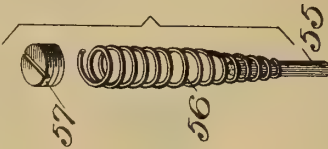


Fig. 9.



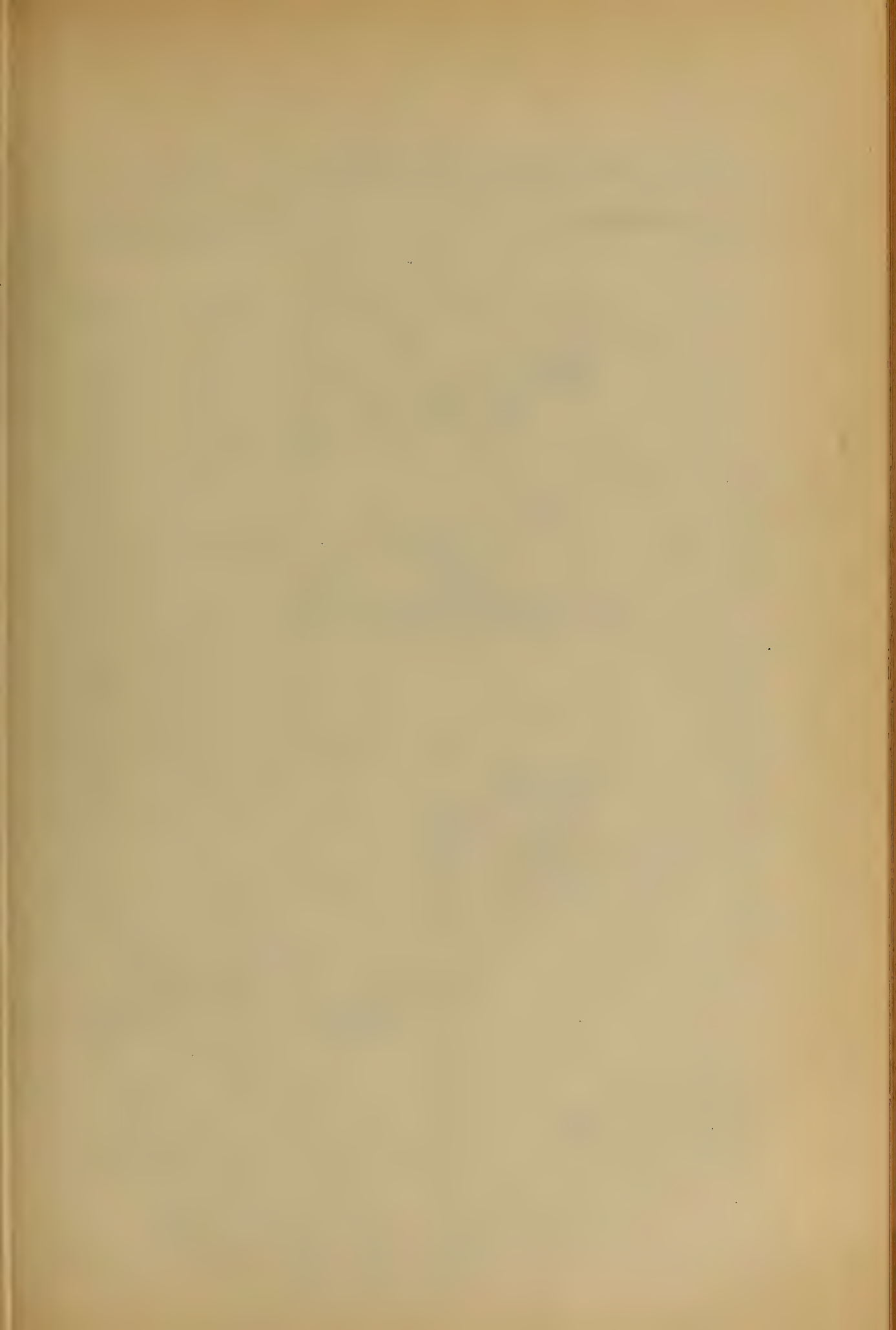
Witnesses

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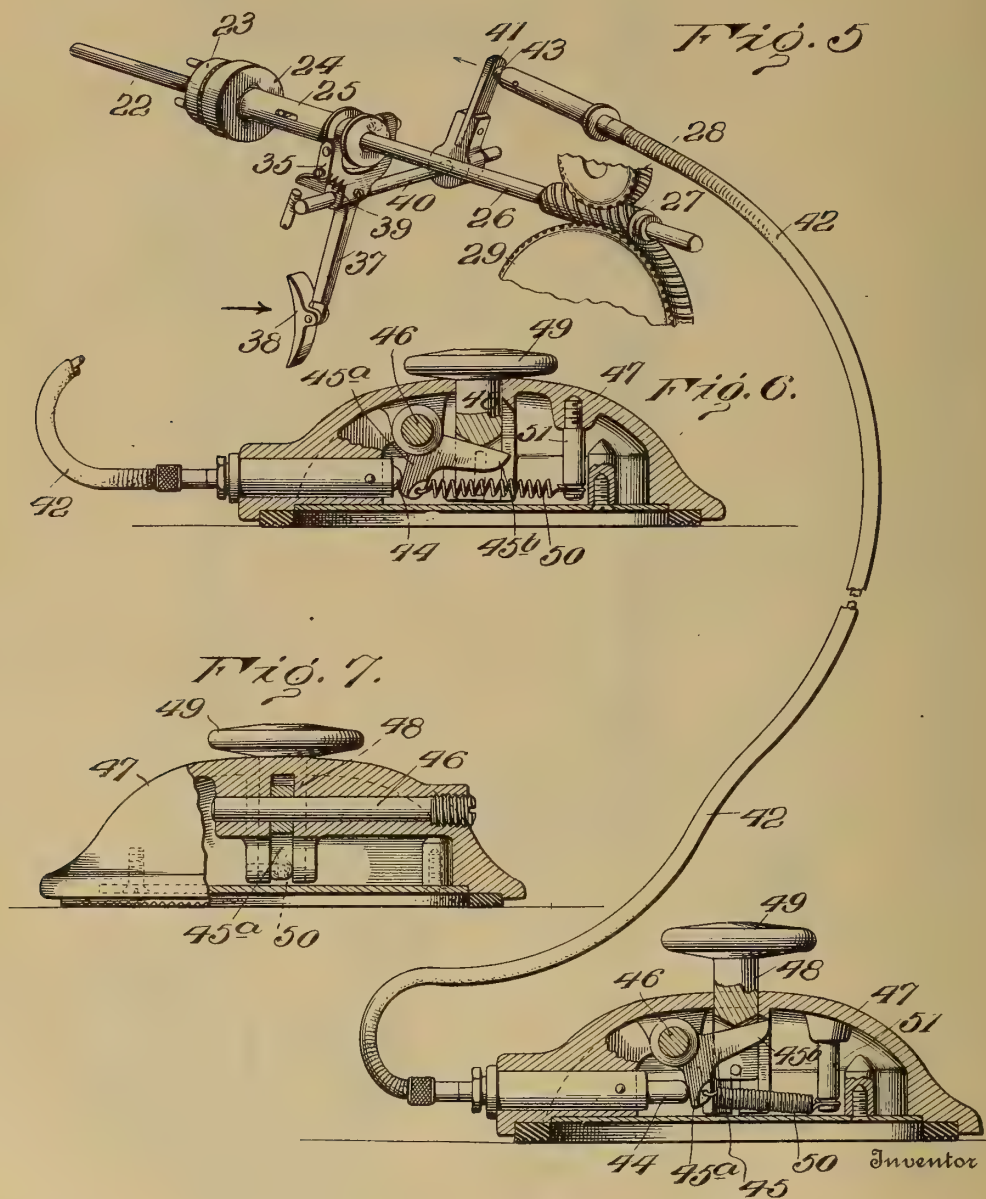
By Mauro. Cameron, Lewis Massie
Attorney



C. E. WOODS.
TALKING MACHINE.
APPLICATION FILED SEPT. 25, 1913.

1,213,443.

Patented Jan. 23, 1917.
4 SHEETS—SHEET 4.



Witnesses
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UNITED STATES PATENT OFFICE.

CLINTON E. WOODS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

TALKING-MACHINE.

1,213,443.

Specification of Letters Patent.

Patented Jan. 23, 1917.

Application filed September 25, 1913. Serial No. 791,821.

To all whom it may concern:

Be it known that I, CLINTON E. WOODS, of Bridgeport, Connecticut, have invented a new and useful Improvement in Talking-Machines, which invention is fully set forth in the following specification.

This invention relates to talking machines, and more particularly to that class of talking machines in which a cylindrical record-tablet or record is mounted upon a suitable mandrel, and the sound-box and the tablet are driven by a suitable motor in the act of recording or reproducing.

The object of the invention is to produce a talking machine of this type, which shall be so constructed as to be highly convenient for desk use, or dictation purposes, which shall be compact, composed of a minimum number of parts, and shall be noiseless in operation, free from vibrations which would interfere with the recording or reproduction of the sound-vibrations, and which shall be capable of being started or stopped with ease by convenient manual manipulation. By "manual," as herein used, is meant, not only operation by the hand alone, but by the foot or other part of the body of the operator.

Further specific objects are to provide for the lubrication of the machine, to the end that it may run for a long time without attention in this regard, and to connect the motor with the operative parts by means of gearing, which shall be free from relative play which would produce vibration of the parts and inaccuracy in timing of the parts, and generally, to improve the appearance and construction, as well as the convenience, of the machine.

With these objects in view, the invention, generally stated, consists of a base-piece, preferably circular in form, from which a column projects centrally upward and supports a motor casing, which motor casing in turn supports the casing for inclosing the gearing, the latter casing supporting the mandrel shaft and one end of the usual feed-screw for propelling the sound-box carriage, the whole being so arranged and proportioned that the center of gravity of the machine as a whole is approximately over the column projecting up from the base. Preferably, a continuously running electric mo-

tor is inclosed in the motor casing, having a shaft whose end projects into the gear casing, and is provided with a worm meshing with a worm gear on one part of a two-part shaft, the other part of said shaft being provided with a worm meshing with two worm gears, one of which is attached to the mandrel shaft and the other to the feed-screw. A suitable clutch device is employed to connect the continuously driven member of this shaft at the will of the operator to the other member of the shaft, or to disconnect it therefrom. Said shaft and the gears co-operating therewith and the clutch device are all inclosed in the gear casing, while a clutch-operating lever projects therefrom, and is provided with a suitable finger-piece in position to be grasped by the operator when drawing the machine toward him, thereby closing the clutch and starting the machine, this action taking place against the tension of a spring, which automatically opens the clutch when the finger of the operator is removed from said finger-piece. Or, one terminal of a Bowden wire may be placed in operative position in relation to said protruding clutch lever, the other terminal of the Bowden wire being in operative relation with suitable lever mechanism, to be actuated by the foot of the operator, or otherwise, to shift the clutch and start the mandrel, the reverse action being due to the tension of a spring, as in the case of a finger-piece; preferably, however, the machine is provided with both the finger-piece and the Bowden wire construction for actuating the clutch lever, to the end that either may be used at will.

In the present invention, the base of the machine, the supporting column, the motor casing and the gear casing, are composed of an integral piece of metal, preferably aluminum, thereby eliminating the inaccuracies which inevitably occur when the several parts of the frame of the machine are made separate and fitted together. With such an integral casing, it is possible, in machining the parts, to bore the holes for the necessary bearings with great accuracy, and to make all of the parts of a large number of machines completely interchangeable.

Another feature of the present invention consists in means whereby worm gearing

may be employed for transmitting motion, and thereby greatly reducing the number of parts, and eliminating the play of parts and vibrations due to looseness of parts, which heretofore existed in machines of this character. In the present invention, two worms are employed, one on the motor shaft and one on the shaft connecting said motor shaft with the mandrel shaft and the feed-screw, and in each instance provision is made for supporting the projecting end of the shaft bearing the worm, so that the latter cannot yield under the stress of operation, but will always run perfectly true and accurate. Such support for the worm on the motor shaft is preferably secured by inclosing the worm in a hollow teat or hub projecting from the wall of the motor casing, which hub or teat has a slot cut in the side thereof to permit engagement of the worm gear with the worm. The other worm referred to is afforded the proper support by placing the worm gearing on the mandrel shaft immediately opposite the worm gearing on the feed-screw shaft, to the end that the thrust due to the one shall be offset or supported by the corresponding thrust due to the other.

In addition to the features above set forth, the invention contemplates the preferable employment of a suitable speed-indicator, a correction device for indicating corrections or other data in connection with the dictated subject-matter, and a suitable speed governor for the motor, all of which last mentioned parts are likewise supported by the central upwardly-projecting column, and preferably directly by the motor casing.

Other specific features and details of the invention will be pointed out in connection with the description hereinafter contained.

The inventive idea involved is capable of receiving a variety of mechanical expressions, one of which, for the purpose of illustrating the invention, is shown in the accompanying drawings, but it is to be expressly understood that such drawings are for the purpose of illustration only, and are not designed to define the limits of the invention, reference being had to the appended claims for this purpose.

In said drawings—Figure 1 is a top plan view; Fig. 2 is an end elevation of the left-hand end of Fig. 1; Fig. 3 is an end elevation of the right-hand end of Fig. 1; Fig. 4 is a front elevation of the machine; Figs. 5, 6 and 7 are details showing the manner of mounting and operating the Bowden wire and its terminals for controlling the clutch-shifting device; Fig. 8 is a detail showing the mandrel bearing supported by the gear casing; and Fig. 9 is a detail of the lubricating device employed in connection with certain of the bearings.

Referring to Figs. 1 to 4, 1 is a base or base-piece, preferably circular in form, and 2 is a suitable supporting column projecting upwardly, preferably from the center of said base-piece. The base 1 is preferably small and flat so as to occupy the minimum space. 3 is a shell or casing within which any suitable motor, preferably an electrical motor, is mounted, said shell or casing being secured to, and preferably formed integral with, the column 2. A gear casing 4 is supported by the motor casing 3, and preferably is formed integral therewith. Said gear casing 4 has formed therein, and supported thereby, bearings for the mandrel shaft 5. Projecting from the motor casing 3 opposite from the gear casing, is a casing 6, inclosing any suitable speed-governor (not shown) for the motor, and any suitable speed-indicator 7, only the scale 8 and the needle 9 of which are shown.

The outer end of the casing 6 inclosing the speed-governor is provided with a closure-piece 10, from which projects, toward the front of the machine, two curved arms 11 and 12 (see Fig. 3), the arm 11 supporting one end of the feed-screw 13, and the arm 12 supporting one end of the correction device 15, shown in Fig. 1. Preferably the two arms 11 and 12 are integrally connected forming a single bracket. Since the specific construction of the correction device forms no part of the present invention, it need not be further described herein.

The motor shaft 16 has one bearing in the left-hand end of the motor casing, as shown in Fig. 1, and said end wall of the motor casing has formed thereon, and preferably integral therewith, a portion, preferably in the form of a hollow teat or hub 18, within which the worm 19 on the motor shaft revolves, and by which it is supported on all sides, except for a slot 20 (Fig. 2) formed preferably in the under side thereof, through which slot a worm gear 21 enters to mesh with the worm 19. Said worm gear 21 is keyed to a shaft 22, to which is secured one member 23 of a clutch, the other member 24 of which clutch is secured to a sleeve 25 sliding on the other part 26 of the shaft, the two shaft parts 22 and 26 forming in effect a continuous shaft when the clutch mechanism is closed and revolving together, said part 26, however, being stationary when the clutch is open, even though the motor be a continuously driven motor. On the end of the shaft part 26 is a worm 27, which meshes with a worm gear 28 on the end of the mandrel shaft 5 on its upper side, and with a worm gear 29 on its lower side, said worm gear 29 being fast on one end 30 of the feed-screw 13, the other end of which has bearing in the arm 11, as before described.

The base 1, the column 2, the motor casing 3, 130

and the gear casing 4 are preferably formed integral, and also preferably formed of cast metal, as cast aluminum, to the end that there can be no variation in the relation of the parts, and to the further end that the bearings for the respective shafts may be bored with great accuracy. It will be observed that the worm 19 on the end of the motor shaft 16 is supported by the hollow teat or hub 18 against the thrust of the worm gear 21, and that the two worm gears 28 and 29 on the opposite sides of the worm 27 act, the one to support the worm on one side, and the other to support it on the opposite side, so that the respective worms will perform their functions unyieldingly and with great accuracy and precision. This is a matter of much importance, since heretofore it has been deemed impracticable to drive talking machine mechanism by worm gearing, though such gearing is well known to be the most accurate and free from noise of operation and vibration. But by the means herein shown, it has been found possible to employ worm gearing, thereby securing the desirable results incident to its use, and avoiding the objections heretofore existing in connection therewith.

The arm 12 not only supports one end of the correction device 15, as heretofore described, but also supports the outer end of the guide-rod 31 for the sound-box carriage 32, which carriage is also provided with the usual or any suitable nut 33 (see Fig. 3) for engaging the feed-screw 13 to propel the carriage, in a manner well understood in this art.

Any suitable sound-box, either for recording or for reproducing, or both, may be mounted on the carriage, and as here shown, a combined recorder and reproducer 34 is mounted thereon, but since the specific construction of said recorder-reproducer does not form any part of the present invention, the details of its construction are not specifically shown or described.

The several parts already described, that is, the motor, the mandrel, the sound-box and sound-box carriage, etc., are so related to each other and to the vertical column 2 that their combined center of gravity lies substantially in line with the column and at an elevation which is low and is shown as being considerably less than the diameter of the base. Inasmuch as this machine is intended for desk use, the several parts are arranged compactly and at as low elevation as possible.

The clutch sleeve 25 is engaged by the forked end 35 (see Figs. 2 and 5) of a clutch-shifting lever fulcrumed in the gear casing at 36, and provided with a depending arm 37 projecting out of the gear casing, upon which arm is pivoted a finger-piece 38, in a position to be grasped by the finger of

the operator when he takes hold of the columnar base of the machine to draw it toward him, this action automatically shifting the clutch so as to connect the two parts 22 and 26 of the shaft, starting the worm 27, and thus starting the mandrel and the feed-screw. This shifting action of the clutch takes place against the tension of a spring 39, and when the pressure of the finger is released from the finger-piece 38, the spring acts to open the clutch, and thus stop the movement of the mandrel and the feed-screw. Preferably, the pivot of the clutch-shifting lever is in the form of a rock shaft 40, one end of which projects outward through the side of the gear casing (see Fig. 5), and has keyed thereto a lever arm 41, and it will be observed that when said lever arm 41 is rocked in the direction of the arrow, it has the same effect on the clutch as when the lever arm 37 is rocked in the direction indicated by its arrow; that is, it closes the clutch to start the mandrel and the feed-screw.

Any suitable means may be employed for acting on the lever arm 41 to close the clutch, but by the present invention, it is preferred to employ a Bowden wire, one terminal of which is in operative relation with the lever 41, and the other is in a suitable position to be actuated by the operator, as for example, on the floor, where it may be actuated by the foot.

Referring to Fig. 5, 42 is the Bowden wire, 43 the terminal in operative relation with the lever arm 41, and 44 is the Bowden wire terminal in operative relation with the bell-crank lever 45 pivoted at 46, preferably on the interior of an oval casing 47, one arm 45^a of the bell-crank lever being in operative relation with the terminal 44, and the other arm 45^b being in the path of a thrust-pin 48, preferably provided with a head 49 upon which the foot is placed to depress the same against the action of a spring 50, one end of which is connected to the arm 45^a of the bell-crank lever 45, and the other to any part of the casing 47, as a depending lug 51. In Fig. 5, the parts are shown in the position which they would occupy when the clutch is open and the mandrel and feed screw standing still. In Fig. 6 the foot member is shown with the parts in the position which they occupy when the pin 48 has been depressed by the foot of the operator, thereby thrusting inward (from right to left in Fig. 6) the Bowden wire terminal 44, which thrust is transmitted to the Bowden wire terminal 43, moving the same from right to left, as shown in Fig. 5, and thus shifting the clutch to close the same and start the mandrel and feed-screw.

Preferably the base-piece 1 is provided with means for starting and stopping the motor, this means being mounted on the base

entirely independently of the column which supports the motor. When an electric motor is used, as herein shown and described, the starting and stopping means can be any
 5 suitable switch 52 (Figs. 2 and 3) for switching current onto or off from the motor, which current is led by conductors 53 from the base-piece 1, through the bottom of the motor casing 3, to the motor, as indicated
 10 in Fig. 2.

For the purpose of lubricating the bearings of the machine, holes are drilled in the walls of the casing, and a suitable lubricating device is inclosed therein. One of these
 15 devices is illustrated in Fig. 1, in which 54 is the opening in the end of the wall of the motor casing, extending down to and through the bearing for the shaft 16, and 55 is a wick in the lower end of said opening, one end of the wick bearing against
 20 the shaft 16. To the upper end of the wick is connected a spring 56, and 57 is a screw-plug closing the opening 54, which opening between the screw-plug 57 and the wick is
 25 filled with a suitable lubricating oil. By means of the screw-plug 57, the tension on the spring 56 may be regulated, thereby regulating the force with which the wick 55 bears against shaft 16, and the spring automatically
 30 compensates for any wear on the end of the wick, due to its contact with the shaft. This lubrication of the shaft at this point not only performs the usual function of lubricating a shaft bearing, but in addition there-
 35 to, performs the very important function of simultaneously lubricating the worm 19, thus insuring smooth cooperation of said worm with the worm gear 21; in other words, lubricating the worm and worm
 40 gear by reason of the small amount of oil which is fed from the shaft bearing 17 out onto and along the worm 19, and from it to the worm gear 21.

Preferably, the parts are all so proportioned, and the location of the supporting
 45 column 2 so arranged that said column is approximately at the center of gravity of the machine, or in a vertical line passing through the center of gravity, to the end
 50 that the equilibrium of the machine may be readily maintained. The machine of the present invention is designed, primarily, for desk use, much as a telephone is employed upon a desk, to be drawn toward
 55 and pushed back from the operator, and it will be perceived that, by reason of its small size, due to its compactness, its equilibrium, its freedom from vibrations that would interfere with its accuracy of operation, and
 60 the facility with which the mandrel may be stopped and started, as well as the convenient arrangement of the correction device, and the location of the speed-indicator, it constitutes a machine of great efficiency in

operation and convenience of manipulation.

While, for the purpose of describing the invention, the preferred form thereof has been set forth with much particularity, the invention is not limited to the specific pro-
 70 portions, materials or arrangements herein set forth, since the same may be varied within the limits of the claims hereto appended.

What is claimed is:—

1. The combination of a flat base, a relatively short column of small cross-sectional
 75 area projecting upward therefrom, and a talking machine comprising a record-mandrel, a sound-box carriage and a motor operatively connected with said mandrel and
 80 carriage, said talking machine being supported by said column with its parts compactly arranged in balanced relation with respect to said column.

2. The combination in a talking machine,
 85 of a flat base, a column of small cross-sectional area projecting upward from the base, and a mechanism supported on the column and comprising a record-mandrel, a sound-box carriage and a motor opera-
 90 tively connected with the mandrel and carriage, the center of gravity of the mechanism being at an elevation above the bottom of the base less than the maximum horizontal dimension of the base.

3. The combination in a talking machine,
 95 of a flat base, a column of small cross-sectional area projecting upward from the base, and a mechanism supported on the column and comprising a record-mandrel, a sound-
 100 box carriage and a motor operatively connected with the mandrel and carriage, the center of gravity of the mechanism lying approximately in the axis of the column and being at an elevation above the bottom
 105 of the base less than the maximum horizontal dimension of the base.

4. The combination in a talking machine,
 110 of a flat base, a relatively short column of small cross-sectional area projecting upward from the base, a record-mandrel and a sound-box carriage supported on the column at one side thereof, and a motor supported
 115 on the column at the other side thereof and operatively connected with the mandrel and carriage, the combined center of gravity of said mandrel, carriage and motor lying approximately in the axis of the column.

5. The combination in a talking machine,
 120 of a flat base, a column of small cross-sectional area projecting upward from the base, a record-mandrel and a sound-box carriage supported on the column at one side thereof, and a motor supported on the column
 125 at the other side thereof and operatively connected with the mandrel and carriage, the combined center of gravity of the mandrel, carriage and motor being at an

elevation above the bottom of the base less than the maximum horizontal dimension of the base.

6. In a talking machine, the combination of a motor-casing, a gear-casing supported by the motor-casing and extending horizontally from one end thereof perpendicularly to the motor axis, a record-mandrel supported by the gear-casing and extending horizontally from the outer end thereof parallelly with the motor axis, and gearing in the gear-casing connecting the motor with the mandrel.

7. In a talking machine, the combination of a motor-casing, a gear-casing supported by the motor-casing and extending horizontally from one end thereof perpendicularly to the motor axis, a record-mandrel supported by the gear-casing and extending horizontally from the outer end thereof parallelly with the motor axis and on the same side of the gear-casing as the motor, and gearing in the gear-casing connecting the motor with the mandrel.

8. In a talking machine, the combination of a motor-casing, a gear-casing supported by the motor-casing and extending horizontally from one end thereof perpendicularly to the motor axis, a record-mandrel supported by the gear-casing and extending horizontally from the outer end thereof parallelly with the motor axis, gearing in the gear-casing connecting the motor with the mandrel, and a vertical column on which the motor-casing is supported, the axis of the column being near the side of the casing from which the gear-casing extends.

9. In a talking machine, the combination of a motor-casing, a gear-casing supported by the motor-casing and extending horizontally from one end thereof perpendicularly to the motor axis, a record-mandrel supported by the gear-casing and extending horizontally from the outer end thereof parallelly with the motor axis and on the same side of the gear-casing as the motor, gearing in the gear-casing connecting the motor with the mandrel, and a vertical column on which the motor-casing is supported, the axis of the column being at the side of the casing adjacent which the mandrel is positioned.

10. In a talking machine, the combination of a motor-casing, a gear-casing supported by the motor-casing and extending horizontally from one end thereof perpendicularly to the motor axis, a record-mandrel supported by the gear-casing and extending horizontally from the outer end thereof parallelly with the motor axis, a sound-box carriage movable along the mandrel, a feed-screw for the carriage supported at one end by the gear-casing, and gearing in the gear-casing connecting the motor with the mandrel and feed-screw.

11. In a talking machine, the combination of a motor-casing, a gear-casing supported by the motor-casing and extending horizontally from one end thereof perpendicularly to the motor axis, a record-mandrel supported by the gear-casing and extending horizontally from the outer end thereof parallelly with the motor axis, a sound-box carriage movable along the mandrel, a feed-screw for the carriage supported at one end by the gear-casing, an arm extending from the motor-casing and supporting the other end of the feed-screw, and gearing in the gear-casing connecting the motor with the mandrel and feed-screw.

12. In a talking machine, the combination of a motor-casing, a gear-casing supported by the motor-casing and extending horizontally from one end thereof perpendicularly to the motor axis, a record-mandrel supported by the gear-casing and extending horizontally from the outer end thereof parallelly with the motor axis, a sound-box carriage movable along the mandrel, a feed-screw for the carriage supported at one end by the gear-casing, gearing in the gear-casing connecting the motor with the mandrel and feed-screw, and a vertical column on which the motor-casing is supported, the axis of the column being near the side of the casing from which the gear-casing extends.

13. In a talking machine, the combination of a motor-casing, a gear-casing supported by the motor-casing and extending horizontally from one end thereof perpendicularly to the motor axis, a record-mandrel supported by the gear-casing and extending horizontally from the outer end thereof parallelly with the motor axis, a sound-box carriage movable along the mandrel, a feed-screw for the carriage supported at one end by the gear-casing, an arm extending from the motor-casing and supporting the other end of the feed-screw, gearing in the gear-casing connecting the motor with the mandrel and feed-screw, and a vertical column on which the motor-casing is supported, the axis of the column being near the side of the casing from which the gear-casing extends.

14. In a talking machine, the combination of a motor-casing, a gear-casing supported by the motor-casing and extending horizontally from one end thereof perpendicularly to the motor axis, a record-mandrel supported by the gear-casing and extending horizontally from the outer end thereof parallelly with the motor axis, a sound-box carriage movable along the mandrel, a guide for the carriage supported at one end by the gear-casing, a feed-screw for the carriage supported at one end by the gear-casing, a bracket secured to the motor-

casing and having two separated arms respectively supporting the other ends of the guide and feed-screw, and gearing in the gear-casing connecting the motor with the mandrel and feed-screw.

15. In a talking machine, the combination of a motor-casing, a gear-casing supported by the motor-casing and extending horizontally from one end thereof perpendicularly to the motor axis, a record-mandrel supported by the gear-casing and extending horizontally from the outer end thereof parallelly with the motor axis, a sound-box carriage movable along the mandrel, a guide for the carriage supported at one end by the gear-casing, a feed-screw for the carriage supported at one end by the gear-casing, a bracket secured to the motor-casing and having two separated arms respectively supporting the other ends of the guide and feed-screw, gearing in the gear-casing connecting the motor with the mandrel and feed-screw, and a vertical column on which the motor-casing is supported, the axis of the column being near the side of the casing from which the gear-casing extends.

16. The combination in a talking machine, of a flat base, a column of small cross-sectional area projecting upward from the base, a mechanism supported on the column and comprising a record-mandrel, a sound-box carriage and a motor operatively connected with the mandrel and sound-box carriage, the center of gravity of said mechanism being at an elevation above the bottom of the base less than the maximum horizontal dimension of the base, and means carried by the base for starting and stopping the motor.

17. The combination in a talking machine, of a flat base, a column of small cross-sectional area projecting upward from the base, a mechanism supported on the column and comprising a record-mandrel, a sound-box carriage and an electric motor operatively connected with the mandrel and sound-box carriage, the center of gravity of said mechanism being at an elevation above the bottom of the base less than the maximum horizontal dimension of the base, and a manually operable switch for the motor carried by said base.

18. In a talking machine, the combination of a base, a short supporting column rising centrally from said base, an electric motor with its inclosing casing supported by said column, a gear-casing supported by said motor-casing and projecting horizontally therefrom, a record-mandrel supported by said gear-casing, and gearing in said gear-casing connecting the motor with the mandrel, the center of gravity of said combined parts supported by said column being approximately in the axis of said column.

19. In a talking machine, the combina-

tion of a base, a short supporting column rising centrally from said base, an electric motor with its inclosing casing supported by said column, a gear-casing supported by said motor-casing and projecting horizontally therefrom, a record-mandrel supported by said gear-casing, a sound-box carriage movable along the mandrel, a feed-screw for the carriage supported at one end by said gear-casing, and gearing in said gear-casing connecting the motor with the mandrel and feed-screw, the center of gravity of said combined parts supported by said column being approximately in the axis of said column.

20. In a talking machine, the combination of a motor-casing, a motor therein, a gear-casing extending from the motor-casing adjacent one end thereof, a two-part shaft in said gear-casing, a clutch device for connecting and disconnecting the two parts of said shaft, gearing connecting one of said shaft parts with the motor, a mandrel supported at one end by said gear-casing, a sound-box-propelling screw, gearing connecting the other of said shaft parts with said mandrel and screw, and a clutch-shifting lever mounted on said gear-casing and having an operating member extending outside of said gear-casing.

21. The combination in a talking machine, of a flat base, a column of small cross-sectional area projecting upward therefrom, a talking machine comprising a motor and a mandrel supported on said column, power connections between said motor and mandrel and comprising a clutch, and clutch-operated means provided with two terminals, one of said terminals being manually operable, and a Bowden wire mechanism operatively connected with the other terminal.

22. In a talking machine, the combination of a motor-casing, a gear-casing extending from one end of the motor-casing perpendicularly to the motor axis, a record-mandrel extending from the outer end of the gear-casing parallelly with the motor axis, a sound-box carriage movable along the mandrel, a feed-screw for the carriage, a two-part shaft in the gear-casing, gearing in the gear-casing connecting one part of the shaft with the motor, gearing in the gear-casing connecting the other part of the shaft with the mandrel and feed-screw, a clutch for connecting and disconnecting the two parts of the shaft, and a clutch shifting member mounted on the gear-casing and having an operating member extending outside thereof.

23. The combination in a talking machine, of a flat base, a column of small cross-sectional area projecting upward from the base, a mechanism supported on the column and comprising a record mandrel, a sound-box carriage, a motor, and a power connec-

tion between the motor and the mandrel and sound-box carriage, said power connection including a clutch, and a clutch-operating means, said last named means comprising a lever extending downward from the clutch and having a finger-piece below the motor and mandrel and above the base.

24. In a talking machine, the combination of a motor-casing, a gear-casing supported by the motor-casing and extending from one end thereof, a record-mandrel supported by the gear-casing, gearing in the gear-casing between the motor and the mandrel and comprising a clutch, a clutch-operating rock-shaft carried by the gear-casing and having two arms thereon one of which is manually operable, a Bowden wire having one terminal in operative relation with the other arm, and manually operated means in operative relation with the other terminal of the Bowden wire.

25. In a talking machine, the combination of a motor-casing, a gear-casing extending from one end of the motor-casing perpendicularly to the motor axis, a record-mandrel extending from the outer end of the gear-casing parallelly with the motor axis, a sound-box carriage movable along the mandrel, a feed-screw for the carriage, a two-part shaft in the gear-casing, worm gearing in the gear-casing connecting one part of the shaft with the motor, gearing in the gear-casing comprising worm wheels connected respectively with the mandrel and feed-screw, and a worm on the other part of the shaft meshing with both of the worm wheels, a clutch for connecting and disconnecting the two parts of the shaft, and a clutch shifting member mounted on the gear-casing and having an operating member extending outside thereof.

26. In a talking machine, in combination with the record-mandrel, a feed-screw, motor and motor-casing thereof, means driving the mandrel and feed-screw from said motor comprising a worm on a projecting end of the motor-shaft and a worm-gear meshing therewith and operatively connected with said mandrel and feed-screw, and a hollow teat or hub on the end wall of said casing provided with a lateral slot, said teat or hub laterally supporting said worm, and said worm-wheel projecting through said slot into engagement with said worm.

27. In a talking machine, in combination with the record-mandrel, feed-screw and motor thereof, means driving the mandrel and feed-screw from said motor comprising a worm on a projecting end of the motor-shaft and a worm-gear meshing therewith and operatively connected with said mandrel and feed-screw, and stationary means directly engaging the side of said worm and thereby supporting the lateral thrust thereon.

28. In a talking machine, in combination with the record-mandrel, feed-screw and motor thereof, means driving the mandrel and feed-screw from said motor comprising a worm on a projecting end of the motor-shaft, a worm-gear meshing therewith, a shaft carrying said worm-gear and provided adjacent its opposite end with a second worm, and worm-gears connected respectively to said mandrel and feed-screw and meshing with said second-named worm on opposite sides thereof, and stationary means directly engaging the side of said first-named worm and thereby supporting the lateral thrust thereon.

29. In a talking machine, the combination of a motor-casing, a gear casing supported by the motor-casing and extending horizontally from one end thereof perpendicularly to the motor axis, a record-mandrel supported by the gear-casing and extending horizontally from the outer end thereof parallelly with the motor axis, gearing in the gear-casing connecting the motor with the mandrel, and a speed governor and speed indicator for the motor supported by the motor-casing independently of the said gear-casing.

30. In a talking machine, the combination of a motor-casing, a gear-casing supported by the motor-casing and extending horizontally from one end thereof perpendicularly to the motor axis, a record-mandrel supported by the gear-casing and extending horizontally from the outer end thereof parallelly with the motor axis, a speed governor and speed indicator for the motor and a casing therefor supported by the motor casing independently of the gear-casing, a sound-box carriage movable along the mandrel, a feed-screw for the carriage supported at one end by the gear-casing, an arm secured to the casing of the governor and indicator and supporting the other end of the feed-screw, and gearing in the gear-casing connecting the motor with the mandrel and feed-screw.

31. The combination in a talking machine, of a flat base, a column of small cross-sectional area projecting upward therefrom, a record-mandrel, sound-box and feed-screw supported above said column, a two-part driven shaft operatively connected with said mandrel and screw, a clutch for connecting and disconnecting said shaft parts, and clutch-operating means comprising a lever extending downward from said clutch and having a finger-piece in a position to be engaged by the finger when the column is grasped by the hand.

32. The combination in a talking machine, of a flat base, a column of small cross-sectional area projecting upward therefrom, a talking machine comprising a motor and a mandrel supported on said column, power connections between said motor and man-

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drel and comprising a clutch, and clutch-
operating means provided with two termi-
nals, one of said terminals having a finger-
piece projecting into the space between the
5 base and the motor and mandrel, and a
Bowden wire mechanism operatively con-
nected with the other terminal.

In testimony whereof I have signed this
specification in the presence of two subscrib-
ing witnesses.

CLINTON E. WOODS.

Witnesses:

JOHN R. PETRIE,

JOHN S. GRIFFITH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

SOUND-RECORD,
#1,213,468-----Victor H. Emerson,
Patented-January 23rd, 1917.
Filed-Dec.16th,1915.

(Assigned to Emerson Phonograph Co.Inc., a Corp. of)
New York state)

V. H. EMERSON.
SOUND RECORD.
APPLICATION FILED DEC. 16, 1915.

1,213,468.

Patented Jan. 23, 1917.

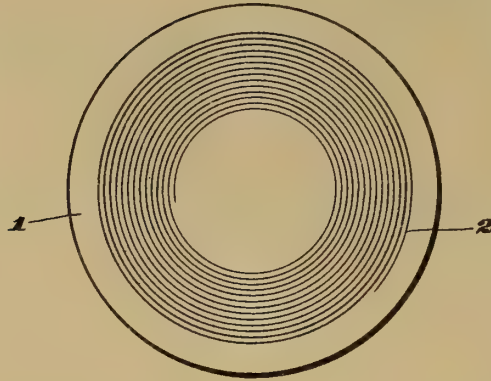


Fig. 1.

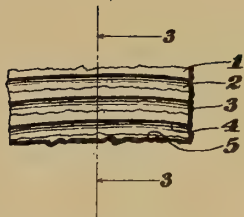


Fig. 2.

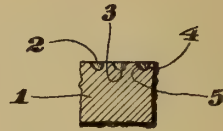


Fig. 3.

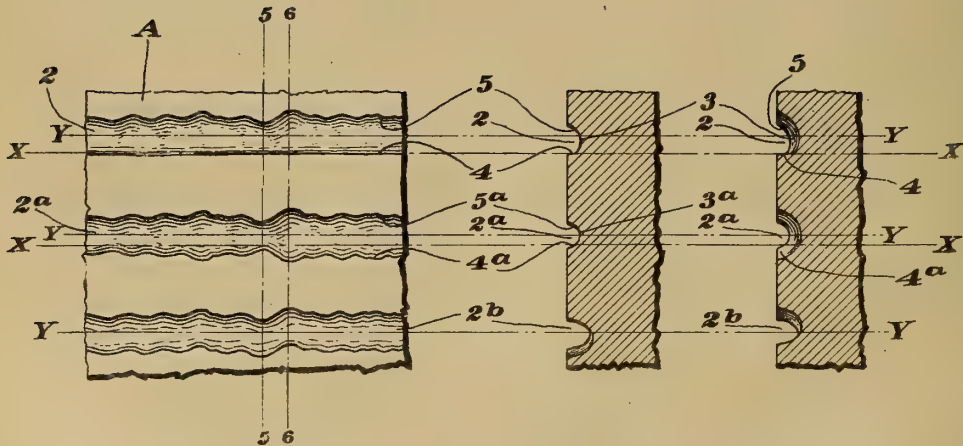


Fig. 4.

Fig. 5. Fig. 6.

Victor H. Emerson Inventor

By his Attorney

W. J. Timmon

UNITED STATES PATENT OFFICE.

VICTOR H. EMERSON, OF NEW YORK, N. Y., ASSIGNOR TO EMERSON PHONOGRAPH COMPANY, INC., A CORPORATION OF NEW YORK.

SOUND-RECORD.

1,213,468.

Specification of Letters Patent.

Patented Jan. 23, 1917.

Application filed December 16, 1915. Serial No. 67,165.

To all whom it may concern:

Be it known that I, VICTOR H. EMERSON, citizen of the United States, residing at No. 435 Riverside Drive, city, county, and State of New York, have invented new and useful Improvements in Sound-Records, of which the following is a specification.

My invention relates to phonographic records of the groove type, or more particularly described, to the form or structure of the record groove employed in devices of the class referred to, and has for an object to provide a sound record groove having undulations representative of sound vibrations which, with reference to the plane of the record, are adapted to actuate a reproducer style both vertically and laterally, whereby the same record may be employed in connection with different types of reproducing machines.

Another object of my invention is to produce a sound record groove which while actuating a vertically operating stylus is adapted to impart additional vibratory impulses thereto by reason of supplemental lateral vibrations; and which, similarly, while actuating a laterally vibrating stylus, will impart thereto vertical vibratory impulses, which supplemental impulses of both forms, while of comparatively reduced amplitude, correspond exactly in frequency with the principal vibration actuating the stylus.

Heretofore record grooves of two types have come into general use, requiring each a reproducer especially adapted to operate therewith. The first form of groove thus employed, now generally termed the hill-and-dale type, has as its operable portion a vertically undulating bottom, and requires a vertically actuated reproducing device especially designed to coact with those undulations. The other type, the zigzag groove record, so-called, requires that the sound box be differently adjusted and equipped so as to vibrate laterally in reproducing the sounds recorded thereon. Consequently many forms of attachments have been designed in order to equip a vertically operating machine so that it can reproduce from a laterally undulating groove, and also to convert machines from the latter to the former mode of operation. Such converting devices not only entail additional expense in connection with the use of talking machines, but require more or less skill to adjust the

parts properly with relation to the different types of grooves. Thus, a definite degree of care must be exercised and in making frequent changes back and forth this task of adjustment becomes irksome and annoying to the operators of talking machines. All these objections may be entirely eliminated by using a record of the form contemplated by my invention, which, generally described, comprises a groove having one side wall and bottom similarly undulatory to produce the required sounds, with the other side thereof having been made entirely neutral and mute, or provided with relatively slight undulations of the same frequency as the first mentioned side wall, which groove is adapted to reproduce with substantially equal fidelity whether the so-called vertical or lateral type of reproducer be employed in connection therewith.

Having reference to the drawings: Figure 1 is a plan view of a familiar disk type, containing in the usual spiral form an embodiment of my improved sound record groove; Fig. 2 is an enlarged partial plan of the disk shown in Fig. 1; Fig. 3 is a sectional view on line 3—3 in Fig. 2; Fig. 4 is an enlarged partial plan view of a supposititious record disk showing types of grooves, and Figs. 5 and 6 are respective sectional views on lines 5—5 and 6—6 of Fig. 4.

Inasmuch as the groove of my improved record has characteristics which are present in both the hill-and-dale and the zig-zag types of groove, to which reference has been made, I have accordingly represented both of those types in the drawings for the convenience of comparison, and in order to point out more definitely the structural differences between the groove of the present invention and those of the two prevailing types now in public use. Therefore, referring to Figs. 4, 5 and 6 of the drawings, A represents a supposititious form of flat sound record tablet having the three grooves 2, 2^a and 2^b, the first named grooved 2 representing a preferred form of my improved sound record groove shown also in Fig. 1 and in enlarged sectional view in Figs. 2 and 3. The groove 2^a is of the familiar hill-and-dale type and is represented as made with a symmetrically formed tool of a tapering or rounded cross-sectional area, and therefore possesses corresponding sinusoidality at its respective sides. Hence, such a

groove if considered in its longitudinal aspect, would show an uneven depth formed by the point of the stylus as it vibrates vertically relatively to the plane or tangent of the record, while traveling longitudinally thereof. The other type of record 2^b, shown in said disk A, is of the zigzag form of construction made by a stylus to which lateral vibrations are imparted as it likewise travels longitudinally in forming this groove. The groove 2^b, were it projected in longitudinal section, would be seen to have an even depth throughout its length, the undulations thereof being confined to its side walls wholly, which it will be seen by referring to Fig. 4 are parallel and therefore are of substantially identical curvature at all transverse cross-sectional points, and hence the curves of one side of a zig-zag groove correspond exactly with the wavelike variations of the opposite side, in the direction, frequency and amplitude thereof, and therefore the opposite walls function harmoniously when operating upon a sound-producing point. As pointed out, the hill-and-dale type of groove 2^a has also laterally undulating walls 5^a, but while the lateral undulations of the respective side walls of this type of groove are similar in amplitude and frequency, they are oppositely disposed, thereby radically differing from the relative arrangement of corresponding undulations of the respective walls of the zigzag groove; and furthermore the groove 2^a has a bottom line 3^a with undulations corresponding to those of the sides, while on the contrary the bottom of the zigzag groove 2^b is devoid of such undulations, but of even depth throughout its entire length. Considering functionally the grooves of these respective types, the hill-and-dale groove 2^a is adapted to actuate the reproducing stylus vertically as its point glides over the undulations along the bottom 3^a, to produce the sound vibrations at all accurately or correctly. On the other hand, in employing the zig-zag groove 2^b to its full efficiency, a laterally reproducing stylus is required to be used therewith for the reason that the controlling undulations are all of that type. Should a laterally vibrating needle, however, be introduced into a groove of the vertically undulating type 2^a, because of the lateral undulations 5^a also present at either side thereof, the needle will accordingly be caused to vibrate laterally, yet not in the orderly and regular manner necessary to reproduce the sounds recorded therein. This result is due to the fact that the undulations of the respective sides of the hill-and-dale groove being oppositely disposed are adapted to neutralize the impulses of one side against those of the others, so that unintelligible, discordant tones result, although in many instances they are appar-

ently of equal volume to the sound which is reproduced by the vertical undulations of the bottom 3^a of such type of groove.

In order to embody in a single groove the essential operable features of both the vertical undulatory groove 2^a and the lateral type groove 2^b, I have constructed the groove 2 which I have found by extensive experimentation should conform in its essential features to that illustrated in Figs. 4 and 5 having the vertical undulations 3 at its bottom and the similar undulations 5 formed upon one side only, but disposed in exactly the same manner and form as in the corresponding side wall 5^a of the groove 2^a shown in supposititious record A, Fig. 3. The opposite wall 4 of the groove 2, however, has none of the irregularities of either type, and is therefore neutral and mute. The surface 4, however, is not without its use, as it may serve as a guiding wall, whenever it comes into contact with the reproducing needle, and also performs the highly important function of protecting the other portions of the groove. On the other hand, it is more or less conjectural to assert what contributory function the wall 4 performs in producing sounds, owing to the fact that the vibrations of the needle thus employed are highly rapid in periodicity and minute in amplitude. For this and similar reasons, I find difficulty in locating with absolute certainty the theoretically exact position of the neutral wall 4 and thereby establish the operable width of the bottom 3 of the groove 2 with equal accuracy, although for all practical purposes it has been sufficiently determined. Thus it will be noted there is no dividing line of demarcation between the bottom 3 and the oblique wall 5, unless it be established by an imaginary plane similar to the wall 4 but oppositely disposed at an equal distance from the vertical medial plane of the groove. Generally described, the position of the wall 4 is so disposed within a vertical or inclined plane as to cut the bottom along the vertically undulating line $x-x$ in Figs. 4, 5 and 6, at a distance from the medial line $y-y$ substantially equaling in width the maximum depth of the vibrations of the lesser amplitude. It will be understood, therefore, that the essential features of the groove of my invention in their broad aspect, comprise an undulatory side and bottom, the latter slightly flattened or rounded, with a neutral or mute side wall 4, that is, one having no sinusosity, which may be vertical or even equally inclined to the undulatory wall. As to the declivity of the oblique wall 5, I have found by careful experimentation, the best results are produced when employed in connection with a stylus vibrating laterally relative to its own axis, if this wall be given an angularity of substantially 45°. When the in-

clination of the wall 5 is carried beyond the 45° angle in the direction of the vertical plane, it loses proportionately in the lateral amplitude of the vibrations measured upon the horizontal face of the record, so that for the best results substantially the 45° angle specified would define the upward limit of the inclination for operating a laterally vibratory needle, although reasonably good results may be obtained by carrying the inclination as high as 50° with reference to the plane of the record. Likewise, when carried in the opposite direction, that is with a tendency to flatten the undulatory wall 5, a larger margin of variation of approximately 15° may be employed and the wall still retain the capacity for operating the laterally undulatory stylus. While the 45° angle declivity of the wall 5 produces the best results for the reasons indicated, and the groove should preferably conform in this particular to the construction described, I do not wish to be held absolutely to the 45° angle specified. The opposite wall 4, whether made substantially vertical or at an angle appreciably widening the groove toward the top, will conform longitudinally to the comparatively straight line of the spiral or helical curvature of the respective flat and cylindrical records respectively; or instead of conforming strictly to the longitudinal spiral or helical lines referred to, a slight undulation may be given to the wall 4 by the cutting tool when it is so desired, with the result that the opposite walls at the surface of the record have a sinuosity remotely suggestive of the general character of the side walls of the so-called zigzag groove of even depth. Yet the important distinction should be borne in mind in connection with the case last supposed, namely, that the bottom 3 of the groove 2 in all of its forms has undulations substantially corresponding in depth, amplitude and frequency to the opposite or oblique wall 5.

It is obvious that the groove of my invention may be cut, traced, pressed, stamped, engraved, or otherwise formed into the substance of the record blank of which it is to constitute a part, of whatever material and in whatever manner employed; and also that it may be applied to a cylinder or disk type of record in the same manner that the lateral and the vertical grooves are now employed.

It is a fundamentally recognized fact that to operate a reproducing sound box properly it is necessary to vibrate the diaphragm of that device by means of the bodily movement of the needle lever which is pivotally attached to the box to vibrate normally in the manner known to all familiar with the art. Consequently the best results are obtained when the recording needle is introduced into a groove which actuates the needle

and diaphragm according to the above mentioned principle of the construction of said reproducing mechanism. Hence, to employ this mechanism most efficiently with a vertically undulating groove, it will be held in one position and when a laterally undulating groove is employed therewith the box will be shifted practically through 90° to permit vibrations in a plane corresponding therewith. However, it is found that a reproducing mechanism adjusted to the position required for the best results as above outlined in connection with a vertically undulating groove will, when applied to a zigzag groove, still reproduce the sounds recorded therein, although in a materially subdued form. This is due to the fact that although the groove of this type has an even depth following the zigzag course thereof, yet in the general direction thereof, as a needle tends to travel longitudinally of the groove, it is constantly crossing and re-crossing the narrow grooves formed at the extreme bottom thereof at substantially the frequency of the primary undulations, which may tend to produce the result referred to. This same effect is obtained but in a more pronounced degree, when a groove of my improved form is employed under the same conditions as those just supposed, for the reason that the undulations at the bottom of such a groove are of greater amplitude and otherwise conform more accurately to those at the side of the groove by means of which a laterally undulating reproducing needle is normally and primarily operated, and therefore the vertical vibrations are communicated to the recording mechanism with augmented force and consequently contribute more effectively to the improved result thus obtained. A somewhat similar effect is to be observed in connection with a recording mechanism which has been adjusted to operate with a vertically undulatory groove whereby supplemental lateral vibrations are imparted thereto by the oblique wall of my improved groove, which principal vibrations are not interfered with by the oppositely disposed undulations that occur in the ordinarily provided vertically undulating groove of the type 2^a illustrated in connection with the disk A (Figs. 4-5). Thus whether employing the recording device in the one form or the other, a double vibrating impulse is imparted as the needle passes over each undulation.

In the cases supposed in addition to transmitting the normal vibrations to the diaphragm by appreciable lateral movement of the vibratory needle lever upon its pivot, that member receives impacts in a direction opposite to that of its said pivotal movement and apparently transmits through internal molecular vibrations those impulses

to the diaphragm and, combined with those of the primary actuations thereof, those impulses increase the sound reproducing capacity thereof. But while thus seeking to explain the probable actions of the mechanisms referred to, I do not consider all the possible factors producing this result have necessarily been specified. But whatever the cause the beneficial result is found to exist as described.

Records provided with my improved groove may be operated by any person familiar with the use of talking machines in the same manner as vertically and laterally actuating records are now separately employed, and therefore a more detailed specification in this particular is not deemed necessary.

Having thus described my invention what I claim is:

1. A sound record having a groove with a rounded bottom and undulations representative of sound vibrations in said bottom and one side thereof, the other side having sound waves recorded thereon of relatively slight amplitude.

2. A sound record having a groove with a rounded bottom and undulations in said bottom and one side thereof, said undulations similarly disposed and representative of sound vibrations, the other side being relatively straight.

3. A sound record having a groove with one wall relatively straight; and an oblique wall inclined at approximately forty five degrees to the vertical plane thereof, said oblique wall having undulations representative of sound vibrations, the bottom thereof having sound undulations therein of ap-

preciable width and corresponding to the vibrations of the oblique wall.

4. A sound record having a groove with a rounded bottom, one wall substantially vertical, and a wall obliquely inclined to said vertical wall said bottom and oblique wall having vibrations of equal frequency and said bottom having greater width than the amplitude of the vibrations recorded thereon.

5. A sound record having a groove of unequal depth and widening toward the top, said groove having one wall disposed approximately at forty-five degrees declivity relative to the vertical plane merging into a bottom of appreciable width and having in the side and bottom of said wall undulations of substantially equal frequency.

6. A sound record having a groove of unequal depth with side walls having approximately parallel undulations of similar frequency and unequal amplitude.

7. A sound record having a record groove therein, said groove having a rounded bottom varying in depth according to sound undulations, and also having one relatively straight wall and an oblique wall, said oblique wall having undulations therein corresponding to the undulations in said bottom.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses, this eighth day of December, 1915.

VICTOR H. EMERSON.

Witnesses:

ANNA W. DILLMAN,
EDITH ENNISON.

RECORD OF LIGHT, SOUND, AND ANALOGOUS
PHENOMENA AND PROCESS AND APPARATUS FOR
PRODUCING THE SAME,

#1,213,613-----Charles E. Fritts,

Patented-January 23rd, 1917.

Original filed-Oct.22nd, 1880, S.No.19,313;

Divided and this application filed June 22nd,1912,
Serial No. 705,346.

C. E. FRITTS, DEC'D.
J. H. FRITTS, ADMINISTRATRIX.
RECORD OF LIGHT, SOUND, AND ANALOGOUS PHENOMENA AND PROCESS AND APPARATUS
FOR PRODUCING THE SAME.
APPLICATION FILED JUNE 22, 1912.

1,213,613.

Patented Jan. 23, 1917.

3 SHEETS—SHEET 1.

Fig. 1

Fig. 2.

Fig. 3

Fig. 4.

Fig. 5.

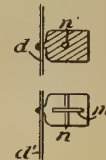
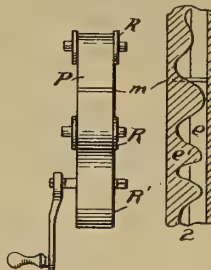
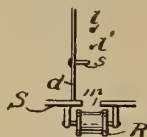


Fig. 6.



Fig. 9.

Fig. 10.

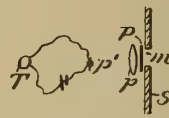
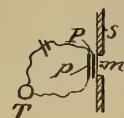


Fig. 7.

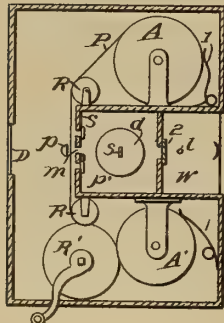


Fig. 8

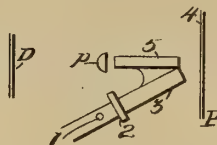
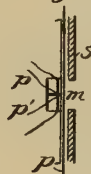


Fig. 11.



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RECORD OF LIGHT, SOUND, AND ANALOGOUS PHENOMENA AND PROCESS AND APPARATUS
FOR PRODUCING THE SAME.
APPLICATION FILED JUNE 22, 1912.

1,213,613.

Patented Jan. 23, 1917.

3 SHEETS—SHEET 2.

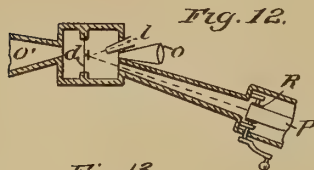


Fig. 13.

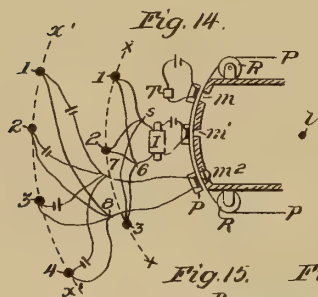
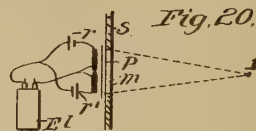
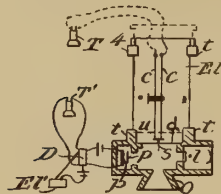


Fig. 15.



Fig. 16.

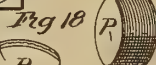


Fig. 19.



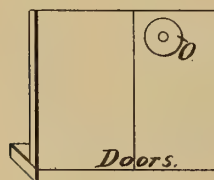
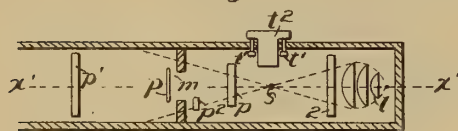
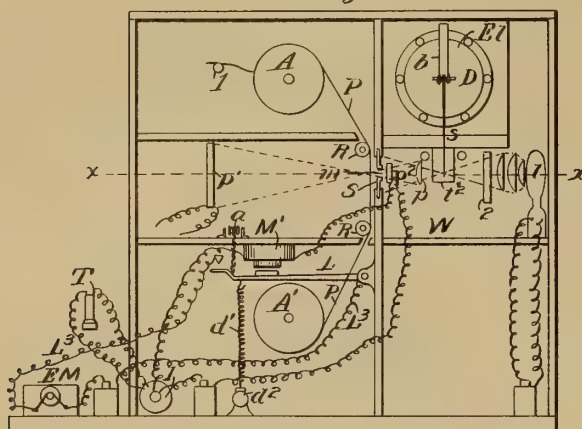
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UNITED STATES PATENT OFFICE.

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RECORD OF LIGHT, SOUND, AND ANALOGOUS PHENOMENA AND PROCESS AND APPARATUS FOR PRODUCING THE SAME.

1,213,613.

Specification of Letters Patent.

Patented Jan. 23, 1917.

Original application filed October 22, 1880, Serial No. 19,313. Divided and this application filed June 22, 1912. Serial No. 705,346.

To all whom it may concern:

Be it known that CHARLES EDGAR FRITTS, now deceased, but formerly a citizen of the United States, residing at Oneonta, in the county of Otsego and State of New York, did invent a new and useful Improvement in Records of Light, Sound, and Analogous Phenomena and Processes and Apparatus for Producing the Same, of which the following is a specification.

This invention relates to recording variations or pulsations in sounds, light or electric currents in a permanent or tangible form and reproducing the same at will not merely at the instrument alone, but also at any other instrument suitably connected therewith.

The present application is a division of the original application, Serial No. 19,313, filed October 22, 1880, and relates to one of the forms of record shown and described in said original application.

The present invention includes the application of photography and electricity for recording and reproducing the variations or pulsations above mentioned by the aid of a diaphragm or equivalent device capable of vibrating under those influences, and particularly under the influence of sounds as hereinafter fully set forth.

For convenience of description the apparatus disclosed will be called a phonograph, but it is to be expressly understood that it is not the intention to limit the scope of the invention to what is commonly known as or done by the so called phonographs or to narrow or restrict the scope of the invention in any way, but the term is used merely for convenience.

The novel features of the invention will be apparent from the following description taken in connection with the accompanying drawings.

In the drawings: Figure 1 is a diagrammatic view illustrating the defective result of attempting to produce a phonograph record by indenting the blank. Fig. 2 is an edge view of a speaking diaphragm having a shutter mounted thereon such as may be used in carrying out the invention. Fig. 3 is a view partly broken away showing a speaking diaphragm carrying a shutter, a

source of light and a roller carrying a sensitive strip exposed to said light through an opening controlled by said shutter. Fig. 4 shows at the left a plan view of the sensitive strip and rollers and at right an enlarged plan view of a portion of the strip having the photographic record thereon. Fig. 5 shows two forms of shutter mounted on diaphragms which may be used in carrying out the present invention. Fig. 6 is a plan view of a strip having thereon a sinuous record produced by the shutter shown in Fig. 5. Fig. 7 is a vertical sectional view of one form of apparatus arranged for making the negative or pattern and moving it along by hand in carrying out the invention. Fig. 8 is a diagrammatic view showing means for reproducing and utilizing an opaque record by reflected light. Fig. 9 shows an electric circuit having a selenium bar therein adapted to be affected by light from the record. Fig. 10 is a similar view showing a flat selenium cell with a lens for concentrating the light from the record on it. Fig. 11 shows two selenium cells arranged for exposure through a single opening to produce alternating current. Fig. 12 is a sectional view of an apparatus having a mirror on the speaking diaphragm for reflecting light to the record surface. Fig. 13 is a sectional view of an apparatus which may be used either for making or utilizing the record. Fig. 14 is a view in detail of a plurality of means for utilizing a single record. Fig. 15 is a plan view of a disk record having the photographic impressions thereon in a spiral. Fig. 16 is a perspective view of a cylinder having a spiral record thereon. Fig. 17 is another form of record having thereon a singular circular pattern. Fig. 18 is still another form showing separate parallel patterns. Fig. 19 is a sectional view of an apparatus for taking and reproducing the record having a lens for concentrating the light upon the strip. Fig. 20 is similar to Fig. 11 showing the electrical connections more clearly. Fig. 21 is a general view of the apparatus disclosed in Fig. 7 but more in detail showing more clearly the arrangement and connection of the parts. Fig. 22 is a horizontal section on the line $x-x$, Fig. 21. Fig. 23

is a perspective view of the doors for the apparatus shown in Fig. 21.

The great trouble with phonographs heretofore is that they have undertaken to record and reproduce delicate air pulsations by crude and clumsy mechanical means. In the operation of the methods heretofore used the metal point used for indenting the record is hindered in its vibrations by the labor of impressing its motion in the foil or other material used in its place. This resistance not only retards the diaphragm itself, but it retards it in a very variable manner. When the tracer point reaches a soft, thin or unsupported spot in the foil it moves farther than the average, while thick or hard spots, reduce the motion below the average. A score of other faults could be mentioned, but the most important is that when the point is descending, the pressure of the foil against its inclined forward surface retards the motion of the diaphragm; but when ascending, it hastens or assists it, thus deforming the vibrations of the diaphragm itself. This will be understood by examining Fig. 1, where *a* is the tracer point, with its front surface inclined backward to prevent clogging. The dotted line *b b* represents the original level of the foil, which is fed along in the direction of the arrow, and the solid curved line shows the actual form of a supposed sound wave, while the dotted curve shows the form which the point will tend to make,—and this discrepancy will be aggravated by the stiffness of the foil, the weakness of the vibration or the spring of the tracer, and many other causes.

The present invention is designed as one means for obviating the difficulties above described and this is accomplished by dispensing entirely with the tracer and its spring and the foil or any substitute for it, or any mechanical pressure devices whatever, for recording the sound waves tangibly.

The present invention employs means for recording the vibrations of the diaphragm which neither retard nor accelerate them, but will truly record the most extreme or violet, or the gentlest pulsations, and every one exactly as it occurred. This is done by causing the diaphragm as it vibrates to vary a light which passes through an aperture to a surface sensitive to light by which the sound waves are fixed and recorded. No matter how many or how different the sounds which are joined in producing the composite sound waves which strike the diaphragm, the true number and intensity of every one of them will thus be preserved unchanged by the process of recording. This record is called the negative and from it can be produced copies or duplicates in the same or other materials and they can

be used for the reproduction of the sounds recorded thereon.

The record of sound after it is produced as above described is utilized to operate a speaking diaphragm by throwing upon it light which has been varied correspondingly with the form of the sound waves recorded as before described which, as is known, causes the diaphragm to vibrate and produce the sounds corresponding to those waves. To accomplish this a powerful beam of light is passed through the negative previously prepared to and upon the diaphragm. This light passes through a narrow slit corresponding to the one used in making the negative, and by moving the negative along behind this slit at the same speed as when making the negative, it is evident that the original variations in the intensity of the light are exactly reproduced, and if they are thrown upon the diaphragm it will give out the same sound as that which originally caused it to vibrate. Thus, instead of trying to shove the diaphragm back and forth by machinery some hundreds or thousands of times per second, at a constantly varying speed, and making each motion exactly according to a prescribed pattern, each one of which may be different from any of the others, the same end in the present invention is accomplished by the slow motion of a single piece or negative, and causing that to control the action of a beam of light directed upon the diaphragm.

Instead of the light beam passing through a transparent negative, it may be thrown upon an opaque negative and the image of the pattern be reflected therefrom and utilized, or the intensity of the light thrown upon the diaphragm may be automatically varied by the negative in many other ways.

In making the negatives, the sound to be recorded is caused to impinge upon a vibrating diaphragm, which is properly damped and arranged, as will be readily understood by those versed in telephony. To the center of the diaphragm *d*, Fig. 2, is fixed a vertical screen or shutter *s* of mica or other light and stiff material, being attached by its center, and the inner corners rounded off a little to prevent their contact with the diaphragm during its backward vibrations, or to the left. It projects out at right angles to the plane of the diaphragm, and in this particular form is made opaque to prevent the passage of any light through it. Fig. 3 is a vertical plan view; *s* is the shutter, *d* the diaphragm, *l* is a powerful light throwing a beam of nearly parallel rays across to the screen or partition *S*, which has a long, narrow slit *m* in it, through which the light passes and strikes the prepared surface, which in this case is represented as a strip of sensitized paper, fed at

a regular speed over the rollers R R. As the diaphragm shutter *s* in this form normally stands, its edges shut the light off from one-half of the slit, and in vibrating it covers up more or less of the slit, according to the extent of the vibrations. The paper strip being carried along behind the slit *m*, Fig. 4, the edge of the shutter will describe a curved line at the junction of the part *e*¹, not acted upon by the light, and *e*, which is acted upon, and by proper treatment the latter may be dissolved away or otherwise made transparent, in any well known way, as will at once be understood by photographers.

By varying the relative distances of the light, the shutter, and the slit or sensitive surface from each other, the apparent amplitude of the sound waves as recorded on the sensitive surface, can be increased without changing their forms. This method of amplifying the vibrations is often important, and can be applied for strengthening pulsations or variations in light or electrical currents, as well as in sounds. For instance, in Fig. 3 the light is shown in two positions, one being marked *l* and the other *l'*.

If, instead of an opaque shutter on the diaphragm, we leave a vertical transparent strip across said shutter, the light will reach the paper strip behind the screen only through the intersection of the two slits in front of it, forming merely a square spot of light, as shown by Fig. 5 at the intersection of the two slits *n* and *m*. The vertical slit on the mica should make the light beam of about the same width as the stationary horizontal slit in the screen. As the diaphragm vibrates and the paper is moved along, we produce (after dissolving out the parts exposed to light, blacking the rest, soaking in oil or otherwise rendering it transparent,) a narrow transparent curve on the paper strip, as represented in Fig. 6. Instead of the vertical strip, we may use a transparent spot, at the point which will fall on the center of the stationary slit when the diaphragm is still, as seen at *n'* on the upper shutter shown in Fig. 5. This, also, makes a negative strip like Fig. 6. These patterns or negatives, and others which can be made by the above described method, are suited for different uses. It is evident that when a correct negative is once obtained, perfect copies can be produced not only by photographic but also by ordinary printing processes, or even by mechanical means, at a merely nominal cost, even for the most elaborate negatives.

Having thus explained the principles of the present invention, Fig. 7 represents an apparatus which has been devised for carrying out the method. At A is a roll of the prepared negative strip, wound upon a bob-

bin, which is mounted in journal bearings in any convenient way. This strip may be of any suitable thin and flexible material, which may be strong fine paper, but what is known as paper parchment is preferred, although many other substances, may be used. It should be covered with a thin film made very sensitive to light, as in any of the instantaneous processes employed in photography, although a dry process will be most convenient with this form of negative. After being properly coated and sensitized, it should be carefully dried, rolled up, and protected from light or damp till ready to use it. It may be thus coated and sensitized either before or after being cut up into strips of width suitable for use, but in the latter case care must be taken in the cutting not to disturb the adhesion of the film to the strip. A suitable width is $\frac{1}{2}$ or $\frac{3}{4}$ inch, and the length will of course be governed by convenience, or the choice of the operator.

The roll A is free to turn, being held only by the spring 1, pressing upon it sufficiently to prevent it from turning faster than the strip is needed. From A, the strip passes over the flanged rollers R R, Figs. 3, 4 and 7; at R¹ is a rubber-faced roller which presses the paper strip between itself and R, tightly enough to prevent the slipping of the strip. It also fits between the flanges of the roller enough to carry that along with it. If desired, it can also press lightly on the roller A¹, to assist in rewinding the strip upon it. To this roller can be applied the power which feeds the strip along before the slit *m* in the screen or partition S. For experiment, or common telegraphic purposes, a crank may be attached to the roller R¹ or R, as shown in Fig. 7, or the strip may be otherwise fed by hand. But when accuracy is required, some motor should be employed which will give the negative a perfectly uniform and known rate of speed. These are not new, and need not be described, as they form no part of my invention. The motor may be attached to or contained in the box or frame of the phonograph, or otherwise connected, as preferred.

The strip being thus fed along at a uniform speed, it is wound upon a second roller A¹, or may simply be fed loosely into the bottom of the box or case of the phonograph. It will now remain unchanged, if kept from light and damp, for days or even weeks,—or, on the other hand, it may be at once developed, intensified, fixed, or otherwise treated, to render the image permanent,—according to the process employed or the effect desired. All of which will be at once understood by those versed in photography, who will be enabled, from the foregoing description, to readily make a neg-

5 active strip having the characteristics re-
 quired, and will probably prefer the gela-
 tin-bromid process. If the paper seems to
 have a greasy nature, it may before apply-
 10 ing the bromid emulsion, be coated with a
 4 per cent. solution of white of egg, to
 which sufficient chrome alum has been added
 to give it a slight bluish tinge. This will
 insure the film adhering perfectly, but it
 15 will seldom be required if a good quality of
 paper or parchment is used. These strips
 being fixed, they may be treated and used
 in different ways. The parts acted upon by
 light may be made transparent, and the rest
 20 blacked and rendered more opaque, and the
 strip used by transmitting light through it;
 or the strip may be left opaque, and used
 by reflected light,—in which case the parts
 acted upon by light should be made as white
 25 or brilliant, and those yet not acted upon as
 black and absorbent of light as possible, all
 of which can be done by any one out of
 many well known ways, and detailed di-
 30 rections are not necessary. For example, a
 strip to be used by transmitted light may
 have the dark parts blacked with carbon
 ink, flexible black varnish, or otherwise, and
 the light parts rendered transparent by dip-
 35 ping in castor oil thinned with absolute al-
 cohol. The finished strip being again
 wound upon the wheel or roller A and prop-
 erly arranged in the phonograph, we can re-
 produce the original variations in the first
 40 beam of light, in another beam of light, by
 feeding the strip before the slit *m* at the
 same speed as when making the negative,
 and throwing the beam of light through it
 as it passes the slit. To do this, the dia-
 45 phragm *d* with its shutter is removed,—the
 upright frame which holds it being ar-
 ranged to slide on a foot-piece which fits
 in grooves, so that it may be slid into its
 place for use or moved back out of the way,
 as desired. The square chamber which con-
 50 tained the diaphragm is now empty or free,
 and allows the light *l* to shine unobstructed
 across it, to and through the slit *m*, onto
 and through the strip which is rapidly fed
 55 before it, whereby the light which passes
 through the strip is varied in precisely the
 same manner as the original beam of light
 was varied by the shutter on the diaphragm
d; *i. e.*, the greater the proportion of the
 strip which is transparent, the longer the
 60 beam of light which is passed through it,
 and vice versa, (see Fig. 4). This light can
 now be used to produce corresponding vari-
 ations or pulsations in sound, electric cur-
 rents, magnetic attractions, etc., as desired.
 65 This varying light can be converted into
 sounds in different ways. It may be passed
 through a plano-convex or rather plano-cy-
 lindrical lens *p*, or any suitable optical de-
 vice, to widen and disperse it properly, and
 be thrown directly upon a thin, hard-rubber

diaphragm D, properly arranged for speak-
 ing or giving out sounds. Or, in place of
 the lens *p*, a selenium bar or cell may be ar-
 70 ranged to receive the light and thereby vary
 a current of electricity flowing through it,
 as shown at *p* in Fig. 9, which current may
 then be conducted to a suitable telephone,
 which is substituted for the diaphragm D,
 and the sounds will be produced by it with
 any desired loudness. Or the current may
 75 be conducted by wire to any other instru-
 ment or place, in the same way as in tele-
 graphy, and there converted into sounds or
 utilized for any other purpose, as in Fig.
 13, where a current from D is represented
 80 as conveyed to a telephone T' at one place
 and to an electrical receiver of any suitable
 kind E' at another place.

When selenium is used for receiving the
 light and varying an electric current, it
 85 may be either in the shape of a bar *p*, cov-
 ering the slit *m*, as shown in Figs. 9 and
 13 or that of a flat cell *p*¹, in Fig. 10, where
 the light passing through the negative or
 pattern P and the slit *m* is converged by the
 lens *p* to a focus upon the selenium cell *p*¹,
 90 or for producing an intermittent current it
 may consist of two selenium cells or bars
 suitably arranged, as shown in Fig. 11, and
 described hereinafter. In either case, the
 95 electric current is arranged to flow through
 the selenium by proper conducting wires,
 and the varying quantity of light which
 falls upon the selenium will correspondingly
 vary the current flowing through it, as is
 100 well known to electricians. The two cells
 Fig. 11 are arranged end to end with their
 approximating ends at the central line 2
 of the pattern strip so that one cell or bar
 is opposite one half of the slit *m* and the
 105 other bar or cell opposite the other half.
 Each cell is arranged to send whatever cur-
 rent flows through it in a direction opposite
 to that of the current from the other cell,
 in any well-known or suitable manner and
 110 each may be supplied with its current from
 different ends or sections of the same bat-
 tery or from separate batteries, as shown in
 Fig. 20, where the two sections of the sele-
 115 nium are inserted in derived circuits or
 branches of the main circuit. In either case,
 the electric current is arranged to flow
 through the selenium by proper conducting
 wires and the varying quantity of light
 120 which falls upon the selenium will corre-
 spondingly vary the current flowing
 through it, as is well known to electricians.

The negative may of course be taken on
 glass, instead of paper, and arranged to be
 properly moved before the slit and light.
 125 Any suitable material may be used, whether
 transparent or opaque, flexible or rigid,
 plane or curved. When the negative strip
 is required to be very narrow, in order to
 save room, instead of the light falling di- 130

rectly upon it, the varying light beam may be received upon a lens and converged to the desired size before being thrown upon the sensitive surface. The negative, in Fig. 7, would then be fed along at D, instead of between p and m . Or, in Fig. 10, the negative would be at p^1 .

When using an opaque strip or negative, the sound waves, or, rather, the variations of light produced by them, are recorded in the same way as already described. But, to reproduce those variations, the strip is fed along with the printed or formerly sensitive side outward, in the path of a beam of light, by which it is powerfully illuminated, and the light reflected from it is utilized instead of transmitted light. Fig. 8 shows the arrangement: l is the light, which passes through the alum-water cell 2, through the tube 3, and illuminates the moving strip 4. 5 is a tube with blackened interior, each end having an aperture corresponding to the slit m , and so directed toward the strip that only the light from that part of the strip which would be covered by the slit m can pass through both apertures,—all of which will be readily understood by photographers. This light is then received by the lens, or other suitable optical device, p , and properly thrown upon the diaphragm D, as before. Or the lens p may be replaced by the selenium bar or cell, and the diaphragm D by one of my telephones, etc., exactly as before described for transmitted light. The distance of the illuminating arrangement from the negative strip is merely sufficient to thoroughly light up the field covered by the tube 5. Tubes 4 and 5 may be of any suitable size, length, and material, all of which may be left to the judgment of the operator, who should arrange the apparatus according to good photographic practice.

The pattern may be made upon a long narrow strip, as described, or arranged spirally over the surface of a plate as in Fig. 15 or a cylinder of any suitable size, shape, and material as in Fig. 16. By making it in a circular form, as in Figs. 17 and 18 and running it around, it will continue to repeat the same sound, word, or phrase, as long as it is turned.

Instead of the hard-rubber diaphragm D, one of celluloid may be used, also soft vulcanized rubber, thin elastic brass and German silver, and other materials. The diaphragm d may be made of any of the materials used in telephony, which are suitable for the employment to be made of it in this process.

The light employed for making the negative should be strongly actinic, and may be direct sun light, or electric or other artificial light having sufficient actinic power for instantaneous photography. It should

be arranged in a chamber W, preferably with a reflector or other means for making the rays nearly parallel. At 2, Fig. 7, they pass through a glass cell filled with alum water, to stop the heat without diminishing the light. They then pass through an aperture of suitable size, across the diaphragm chamber, where they are manipulated by the shutter s , and through the slit m , as already described. For using the negative, so strong a light will not always be needed, and a good kerosene lamp will answer for most ordinary purposes. Gas light is not suitable, unless a steady flame can be obtained, as a flickering light will interfere with the perfection of the speaking. For purposes requiring accuracy, however, a light should be used having ample actinic power, and the stronger the better. No harm can be done by having a light unnecessarily strong as it cannot be strong enough to do any harm.

The whole apparatus is inclosed in a close box or casing, as shown in Figs. 7, 12, 13, to exclude external light, particularly from the negative. The light chamber W should be so tight that none of the light can penetrate the partitions around it, except through the cell 2. The diaphragm chamber is also inclosed on all sides except the one facing the sounds to be recorded, and the only opening on that side is through the bell or mouth-piece conducting the sound to the center of the diaphragm. All the interior surfaces are made densely black, in order to absorb and prevent the reflection of any light that may find its way inside. Suitable openings or doors are provided wherever necessary, for giving access to the different parts, which may be arranged to suit the convenience of the operator. This care about the light is required more especially while making the negative. For speaking purposes much less caution is needed. When the apparatus is used to enable one light to control another and stronger one, the former is thrown upon the other side of diaphragm d , which controls the light l as illustrated in Fig. 12.

By suitably attaching the expansion wires of my telephone to the diaphragm d of the phonograph instead of to its own diaphragm d , my phonograph will make negatives of the sounds or signals transmitted to it over the line in connection with the telephone. This arrangement is shown in Fig. 13. The telephone is designated by EZ , the base of which slides in the cleats $t t$ to the position shown by the dotted lines at its ends. cc are the suspension wires running to the cross piece u which is attached to the diaphragm d which is carried by the base of the telephone and, consequently, moves with the binding posts at the other ends of the wires cc when the diaphragm and shutter are to be moved back out of the way—thus avoiding any dis-

arrangement of the telephonic adjustments thereby. T is the telephone, telegraphic instrument or other apparatus which transmits sounds, electrical impulses, or signals from a distance to the telephonic devices EL by means of which those influences are enabled to actuate the phonograph and produce records or "patterns" thereof as already described. The same apparatus EL can, of course, be employed for transmitting messages, etc., as well as for receiving them. The phonograph can, therefore, remain in the office and the speech, music, or signals be transmitted to it by telephone for record and preservation. In this form as in others light from l passes across the shutter s when that shutter is in the position shown in full lines and falls on the sensitized strip P. When the shutter s is moved back out of the way and a developed strip is substituted for the sensitized strip P, the light passes through it to the selenium cell p in circuit with the primary of a transformer D. The telephone T' and any other suitable sound reproducer EL' are in circuit with the secondary.

In Fig. 14, the invention is shown with the parts arranged to reinforce the reproduced sound at various distances from the main apparatus. In this instance, the light l is within a casing having a semi-cylindrical end in which are formed the slits m , m' and m^2 . The record strip P passes over the rollers R and across the slits m , m' and m^2 , whereby the light from l passes through the slits to the selenium cells p placed opposite them. The telephone or sound reproducer T is in circuit with the selenium cell at slit m . The current from the second cell at slit m' passes through the primary wire of an induction coil I, the secondary of which sends an induced current through the several sound reproducing devices 1, 2 and 3, arranged in the arc of a circle with the main apparatus as the center, the characters s and 6 indicating the circuit connections whereby the single current passes through each of the reproducers. A second set of reproducing devices 1, 2, 3 and 4 are shown arranged on the arc of a circle x' , x' , at a greater distance from the apparatus, the circuit connections being shown at 7 and 8. These series of reproducers on lines x , x , and x' , x' , are for the purpose of reinforcing in a large hall, the sound coming from the reproducer T, the distance between the slits m , m' and m^2 and the speed of movement of strip P being so regulated that the sound from T will have traveled through the air to the line x , x at the moment that the corresponding portion of the strip P reaches slit m' so as to operate the reproducers on the line x , x at the same moment that the sound traveling through the air reaches that point.

In Fig. 19, the light from l after being varied by the shutter s carried by the dia-

phragm d passes through the slit m , and is converged by the lens p and then falls upon the negative P. Instead of falling on the negative P, a speaking diaphragm D may be substituted for it and the light will then fall on the diaphragm.

Fig. 11 represents the arrangement for transmitting signals by the phonograph records above described, except that the strip or negative p is fed past the slit m transversely, instead of lengthwise of it, as it would appear to be in the drawing. m is the narrow slit, long enough to cover the length of the two selenium bars p and p' , each being inclosed and protected from all light except that which passes through the slit and the negative strip P. Each bar has proper wires to conduct the current through it, which are so connected up that each bar directs the current which flows in it through the line in an opposite direction, and their resistances are such that no current (or a very slight one) flows through either of them as long as they are kept in the dark. But immediately that the negative strip admits light to either bar, its resistance is lessened, and the current flows through that bar to the line, or to the primary coil of an inductorium which sends the induced current to line, or to any other devices, as the case may be,—the strength of the current being in proportion to the length of the bar thereby exposed to the light. The electrical connections are as more fully shown in Fig. 20 or they may be arranged in any other suitable or well known manner. The longer the transparent part of the strip or signal, the more of the bar is lighted up, and the stronger the current which flows through it. When the other bar is illuminated, the same effect is produced, but the current is sent through the line or circuit in the opposite direction,—all of which will be readily comprehended and effected by electricians. Fig. 21 shows the general arrangement of the apparatus in more detail than Fig. 7. When in use the works are shut in by tight doors, as in Fig. 23, where O is the mouth piece through which vocal or other sounds are thrown on the diaphragm D. This mouth piece may be a deep bell-shaped cavity directly over the diaphragm or be fitted to the face and be connected by a tube ending over the diaphragm. The effect is much increased by having the mouth piece fit closely to the face of the speaker.

EL represents an electrical apparatus capable of vibrating the diaphragm D when a telephonic, telegraphic or other suitable current is passed through it and thereby vibrating the shutter s placed in the path of the beam of radiant rays from l here shown as an electric lamp, and thus varying said beam in accordance with the extent and character of its own movements. The beam thus

varied is in the first instance thrown upon the sensitized strip P fed down from reel A over guide roller R before the opening or slit *m* on to another reel A'. The strip having been properly treated to bring out and fix the image thus obtained and render it suitable for use as a pattern, as before described, it is again wound upon reel A and its end hooked to reel A'. The apparatus EL is moved back far enough to take shutter *s* out of the beam of radiant rays which then pass through the negative and are varied thereby as they had been previously varied by the shutter *s*, after which they fall upon a selenium cell or other suitable apparatus *p'*, all as heretofore explained.

Fig. 22 is a horizontal section through the lines *x-x* of Fig. 21, showing the light and lenses *l*, alum cell 2, shutter *s*, cylindrical lens *p* which converges the light laterally to a long narrow streak where it passes through the opening *m* to strip P. The set-screws *t' t'* may be adjusted to change the position of the block *t*² carrying apparatus EL to bring the shutter *s* to the right point. *p*² as shown in Fig. 21 is a small selenium cell which serves to automatically start off the strip P when the phenomenon occurs which is to be recorded. The shutter *s* is caused to vibrate, as already stated, and thereby uncovers the cell *p*², allowing the light which had previously been stopped by the shutter to fall upon the cell and by increasing its conductivity an electric impulse is sent through the starting magnet M'. This immediately pulls up the armature and lever L and raises the pawl which had previously held the reel A', whereupon the reel is suddenly revolved and draws the strip P past opening *m* until the sound or other phenomena ceases, when the shutter becomes still, the current substantially ceases to flow through the cell *p*² and magnet M', the lever L drops and the reel A' is stopped. When reproducing the recorded phenomena the lever L is lifted manually by a cord *a* running over a pulley through an aperture to the outside at some accessible point, where it can be pulled when desired. The current of the cell *p*² can also be sent through induction coil I and transmit the message if desired to a telephone T at the same time that it is being recorded on P.

Any suitable motor EM is connected by circuit wires L³ to lever L and when that lever is raised it completes the circuit. The spring *d'* tends to hold the lever down.

The shutter may be attached to the center of the diaphragm, or at the end of a light lever, as in Fig. 21, pivoted in a bar or support *b*. The diaphragm being connected to the short arm of the lever a greatly increased motion of the shutter is obtained.

Instead of a shutter cutting off transverse light rays, we may use a plane mirror at-

tached to the center of the diaphragm, and place the light in front but a little to one side, as shown in Fig. 12; the light beam from the point *l* will be reflected to the other side of the center to the strip P. Now when the diaphragm vibrates under the influence of sound entering through the mouth pieces O and O' the spot of light will also change its position, and the amplitude of its vibrations will be greatly increased by the angle between the light and the central line or axis of the mirror. A uniform pencil of light being thus vibrated on the sensitive surface will produce a sinuous record line as shown in Fig. 6. It will be observed that the sinuous record line produced by the vibrations of the spot of light whether by means of the mirror or of the shutter shown in Fig. 5 will be of uniform character at all points and will not vary in width or breadth but will merely vary in lateral position.

The messages sent by the apparatus described can be received by a telephone and spoken, printed, embossed, repeated, sent on or otherwise disposed of.

It will be observed that according to the present invention the speaking diaphragm is not called upon to do the physical work of actually making the record on the receiving body or surface. The record is made by a transmitted medium and the diaphragm merely controls the point of incidence. In other words, a pencil of light is projected on the record surface and the diaphragm has nothing to do save to vibrate it in accordance with sound waves.

It will be understood that the invention is not confined to the particular structural features shown and that it is adapted for various uses.

What is claimed is:

1. The combination with a speaking diaphragm, of a movable photo-sensitive body, a source of light adapted to throw a beam on said body, and means operated by said diaphragm for controlling the lateral position of said beam on said body.

2. The method of making a sound record which consists in photographically tracing on a sensitive surface a sinuous line of uniform width in accordance with sound pulsations.

3. The method of making a sound record which consists in photographically tracing on a sensitive surface a sinuous line of uniform width in accordance with sound pulsations, and then producing by the use of said photographically produced record commercial sound records capable of reproducing the sound.

4. The method of making a sound record which consists in photographically tracing on a sensitive surface a sinuous line of uniform width in accordance with sound pulsa-

tions, so treating said record as to change the relative elevation of said line and the adjacent surface of the record.

5 The method of making a sound record which consists in photographically tracing on a sensitive surface a sinuous line of uniform width in accordance with sound pulsations, so treating said record as to change the relative elevation of said line and the adjacent surface of the record and making from said record commercial sound records capable of reproducing the sound.

6 The process of making sound records by photographing the movements of a pencil of light actuated by sound waves and caused to impinge on, and proceed in a general spiral path over, a sensitive film, and developing this photo-trace to produce a line of uniform width having lateral undulations, in the said film.

7 The process of making sound records which consists in vibrating a pencil of light in consonance with the movements of a body actuated by sound waves, moving an amorphous sensitized film under the point of incidence of the pencil so that it travels over a spiral path, developing this trace of the light on the film into an undulating surface in the film by chemical means.

8 The combination with a source of light furnishing an elongated beam, means for varying the position of said beam in accordance with sound pulsations, a surface sensitive to light, and means for moving the surface along in the path of said beam.

9 Apparatus for photographically recording sound comprising a reflector mounted to vibrate on a diaphragm, means for directing a converging beam of light thereon, a sensitive film and means for moving it under the focus point of the beam, substantially as described.

10 In sound recording apparatus a movably mounted reflector, a sound diaphragm carrying means to actuate the reflector, a lens for throwing a converging beam of light on the reflector and means for recording the movements of the beam of light.

11 In a photographic recording apparatus the combination of a stationary lens for converging and directing a beam of light, a sound diaphragm and a means fixed on the diaphragm for angularly vibrating the beam of light with the linear vibrations of the diaphragm.

12 In a photographic recording apparatus the combination of a vibrating body having a reflecting surface, a lens arranged to converge and direct on said surface a beam of light at an acute angle, whereby the linear vibration of the body angularly vibrates the beam of light, for the purpose specified.

13 The combination of a sound diaphragm mounted in a closed housing, a reflecting spot on the diaphragm, a lens to converge a beam of light and direct it on the diaphragm at an acute angle, the area of the reflecting spot being of a size to reflect part of the rays of light in the beam, substantially as described.

14 In a sound recording mechanism, the combination with a photosensitive surface of means for creating a pencil of light, and means for causing said pencil of light to move in a sinuous path along said photosensitive surface in accordance with sound waves.

15 The process of making sound reproducing records by vibrating a ray of light in consonance with the movements of sound waves, moving a light-sensitive film across the field of play of the said ray and reducing the resulting trace of the said ray by chemical means to material form as an undulating surface in amorphous material.

16 A sound record consisting of a line photographically traced and chemically developed in an amorphous material by chemical means, the said line being of uniform width and depth and having lateral undulations.

17 In a sound recording apparatus the combination with a source of light, a reflector for imparting vibrations to a beam of light, means for vibrating said reflector in accordance with sound waves, a photo-sensitive surface and means for moving said photo-sensitive surface across the path of said vibrating beam.

In testimony whereof I affix my signature in presence of two witnesses.

JOSEPHINE H. FRITTS,
Administratrix of the estate of Charles Edgar Fritts, deceased.

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RECORD OF PULSATIONS OF SOUND AND ANALOGOUS
PHENOMENA AND PROCESS AND APPARATUS FOR PRO-
DUCING THE SAME,

#1,213,614-----Charles E. Fritts,

Patented-January 23rd, 1917.

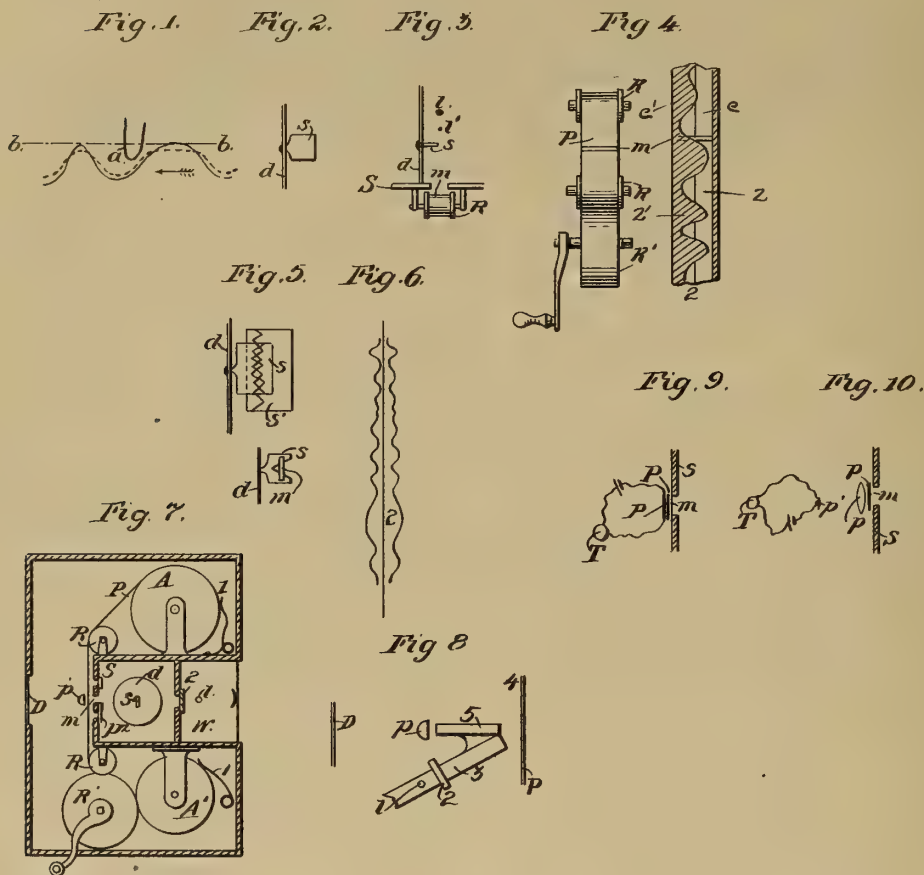
Original Filed-Oct.22nd, 1880,Ser.No. 19,313;

Divided and this application filed June 22nd, 1912,
Serial No. 705,347.

C. E. FRITTS, DEC'D.
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RECORD OF PULSATIONS OF SOUND AND ANALOGOUS PHENOMENA AND PROCESS AND
APPARATUS FOR PRODUCING THE SAME.
APPLICATION FILED JUNE 22, 1912.

1,213,614.

Patented Jan. 23, 1917.
3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.

Fig. 11.

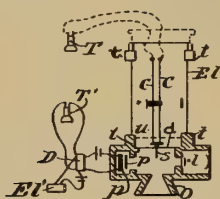


Fig. 21.

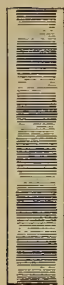


Fig. 12. Fig. 13.



Fig. 15.

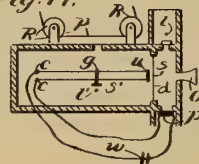
Fig. 14.



Fig. 16.



Fig. 17.



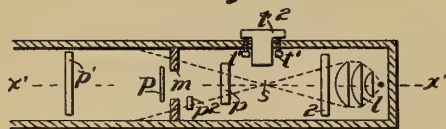
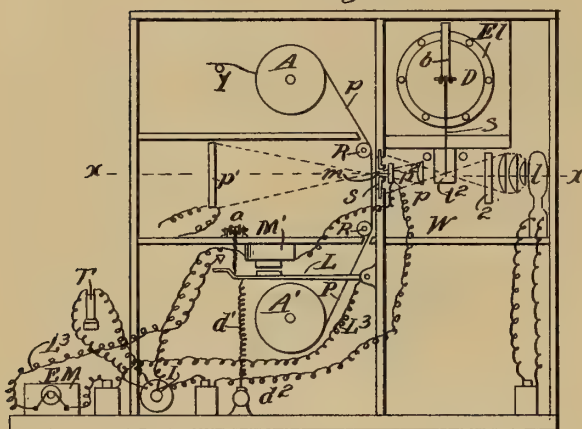
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RECORD OF PULSATIONS OF SOUND AND ANALOGOUS PHENOMENA AND PROCESS AND APPARATUS FOR PRODUCING THE SAME.

1,213,614.

Specification of Letters Patent.

Patented Jan. 23, 1917.

Original application filed October 22, 1880, Serial No. 19,313. Divided and this application filed June 22, 1912. Serial No. 705,347.

To all whom it may concern:

Be it known that CHARLES EDGAR FRITTS, now deceased, but formerly a citizen of the United States residing at Oneonta, in the county of Otsego and State of New York, did invent a new and useful Improvement in Records of Pulsations of Sound and Analogous Phenomena and Processes and Apparatus for Producing the Same, of which the following is a specification.

This invention relates to recording variations or pulsations in sounds, light or electric currents in a permanent or tangible form and reproducing the same at will not merely at the instrument alone, but also at any other instrument suitably connected therewith.

The present application is a division of the original application, Serial No. 19,313, filed October 22, 1880, and relates to one of the forms of record shown and described in said original application.

The present invention includes the application of photography and electricity for recording and reproducing the variations or pulsations above mentioned by the aid of a diaphragm or equivalent device capable of vibrating under those influences, and particularly under the influence of sounds as hereinafter fully set forth.

For convenience of description the apparatus disclosed for utilizing the record produced will be called a phonograph, but it is to be expressly understood that it is not the intention to limit the scope of the invention to what is commonly known as or done by the so-called phonographs or to narrow or restrict the scope of the invention in any way, but the term is used merely for convenience.

The novel features of the invention will be apparent from the following description taken in connection with the accompanying drawings.

In the drawings: Figure 1 is a diagrammatic view illustrating the defective result of attempting to produce a phonograph record by indenting the blank. Fig. 2 is an edge view of a speaking diaphragm having a shutter mounted thereon such as may be used in carrying out my invention. Fig. 3 is a view partly broken away showing a

speaking diaphragm carrying a shutter, a source of light and a roller carrying a sensitive strip exposed to said light through an opening controlled by said shutter. Fig. 4 shows at the left a plan view of the sensitive strip and rollers and at right an enlarged plan view of a portion of the strip having the photographic record thereon. Fig. 5 shows two additional forms of shutters which may be used. Fig. 6 shows the form of record produced by the shutter shown in Fig. 5. Fig. 7 is a vertical sectional view of one form of apparatus arranged for making the negative or pattern and moving it along by hand in carrying out my invention. Fig. 8 is a diagrammatic view showing means for reproducing and utilizing an opaque record by reflected light. Fig. 9 shows an electric circuit having a selenium bar therein adapted to be affected by light from my record. Fig. 10 is a similar view showing a flat selenium cell with a lens for concentrating the light from the record on it. Fig. 11 is a sectional view of an apparatus which may be used either for making or utilizing the record. Fig. 12 is a plan view of a disk record having the photographic impressions thereon in a spiral. Fig. 13 is a perspective view of a cylinder having a spiral record thereon. Fig. 14 is another form of record having thereon a single circular pattern. Fig. 15 is still another form showing separate parallel patterns. Fig. 16 is a sectional view of an apparatus for taking and reproducing the record having a lens for concentrating the light upon the strip. Fig. 17 is a sectional view of an apparatus adapted to strengthen light pulsations which are recorded or reproduced. Fig. 18 is a general view of the apparatus disclosed in Fig. 7 but more in detail showing more clearly the arrangement and connection of the parts. Fig. 19 is a horizontal section on the line $x-x$, Fig. 18. Fig. 20 is a perspective view of the doors for the apparatus shown in Fig. 18. Fig. 21 is a view of a record strip varying in density longitudinally in accordance with the present invention.

The great trouble with photographs heretofore is that they have undertaken to record and reproduce delicate air pulsations by

crude and clumsy mechanical means. In the operation of the methods heretofore used the metal point used for indenting the record is hindered in its vibrations by the labor of impressing its motion in the foil or other material used in its place. This resistance not only retards the diaphragm itself, but it retards it in a very variable manner. When the tracer point reaches a soft, thin or unsupported spot in the foil it moves farther than the average, while thick or hard spots, reduce the motion below the average. A score of other faults could be mentioned, but the most important is that when the point is descending, the pressure of the foil against its inclined forward surface retards the motion of the diaphragm; but when ascending, it hastens or assists it, thus deforming the vibrations of the diaphragm itself. This will be understood by examining Fig. 1, where *a* is the tracer point, with its front surface inclined backward to prevent clogging. The dotted line *b-b* represents the original level of the foil, which is fed along in the direction of the arrow, and the solid curved line shows the actual form of a supposed sound wave, while the dotted curve shows the form which the point will tend to make,—and this discrepancy will be aggravated by the stiffness of the foil, the weakness of the vibration or the spring of the tracer, and many other causes.

The present invention is designed as one means for obviating the difficulties above described and this is accomplished by dispensing entirely with the tracer and its spring and the foil or any substitute for it, or any mechanical pressure devices whatever, for recording the sound waves tangibly. The present invention employs means for recording the vibrations of the diaphragm which neither retard nor accelerate them, but will truly record the most extreme or violent, or the gentlest pulsations, and every one exactly as it occurred. This is done by causing the diaphragm as it vibrates to vary the quantity of light which passes through an aperture to a surface sensitive to light by which the sound waves are fixed and recorded. No matter how many or how different the sounds which are joined in producing the composite sound waves which strike the diaphragm, the true number and intensity of every one of them will thus be preserved unchanged by the process of recording. This record is called the negative and from it can be produced copies or duplicates in the same or other materials and they can be used for the reproduction of the sounds recorded thereon.

The record of sound after it is produced as above described is utilized to operate a speaking diaphragm by throwing upon it light whose intensity has been varied correspondingly with the form of the sound

waves recorded as before described which, as is known, causes the diaphragm to vibrate and produce the sounds corresponding to those waves. To accomplish this a powerful beam of light is passed through the negative previously prepared to and upon the diaphragm. This light passes through a narrow slit corresponding to the one used in making the negative, and by moving the negative along behind this slit at the same speed as when making the negative, it is evident that the original variations in the intensity of the light are exactly reproduced, and if they are thrown upon the diaphragm it will give out the same sound as that which originally caused it to vibrate. Thus, instead of trying to shove the diaphragm back and forth by machinery some hundreds or thousands of times per second, at a constantly varying speed, and making each motion exactly according to a prescribed pattern, each one of which may be different from any of the others, the same end in the present invention is accomplished by the slow motion of a single piece or negative, and causing that to control the action of a beam of light directed upon the diaphragm.

Instead of the light beam passing through a transparent negative, it may be thrown upon an opaque negative and the image of the pattern be reflected therefrom and utilized, or the intensity of the light thrown upon the diaphragm may be automatically varied by the negative in many other ways.

In making the negatives, the sound to be recorded is caused to impinge upon a vibrating diaphragm, which is properly damped and arranged, as will be readily understood by those versed in telephony. To the center of the diaphragm *d*, Fig. 2 is fixed a vertical screen or shutter *s* of mica or other light and stiff material, being attached by its center, and the outer corners rounded off a little to prevent their contact with the diaphragm during its backward vibrations, or to the left. It projects out at right angles to the plane of the diaphragm, and in this particular form is made opaque to prevent the passage of any light through it.

Fig. 3 is a vertical plan view; *s* is the shutter, *d* the diaphragm, *l* is a powerful light throwing a beam of nearly parallel rays across to the screen or partition *S*, which has a long, narrow slit *m* in it, through which the light passes and strikes the prepared surface, which in this case is represented as a strip of sensitized paper, fed at a regular speed over the rollers *R R*. As the diaphragm shutter *s* in this form normally stands, its edges shut the light off from one-half of the slit, and in vibrating it covers up more or less of the strip, according to the extent of the vibrations. The paper strip being carried along behind the slit *m*, Fig.

4, the edge of the shutter will describe a curved line at the junction of the part e^1 , not acted upon by the light, and e , which is acted upon, and by proper treatment the latter may be dissolved away or otherwise made transparent, in any well known way, as will at once be understood by photographers.

By varying the relative distances of the light, the shutter, and the slit or sensitive surface from each other, the apparent amplitude of the sound waves as recorded on the sensitive surface, can be increased without changing their forms. This method of amplifying the vibrations is often important, and can be applied for strengthening pulsations or variations in light or electrical currents, as well as in sounds.

Another way is to have two shutters, one on the diaphragm as before, only larger, and the other stationary, and parallel to but not touching it. These shutters are painted, or otherwise treated to make them opaque up to a certain point, the rest being transparent. These opaque edges are notched, so that at their junction they lap so as to form square or diamond spaces which are transparent, as in Fig. 5, where s is the vibrating shutter, and s^1 is the stationary one. In this case, the slit in the screen before the paper strip is placed vertically, and the paper is fed past it horizontally. Consequently, as the movable shutter s is vibrated to and fro before the other, these transparent squares or diamonds become alternately larger and smaller. But they should not quite meet nor be quite extinguished even by the greatest vibrations of the diaphragm. The result is to produce on the opaque negative strip transparent lines of varying width, one of which is shown enlarged in Fig. 6. If a narrow beam of light is sent through it, it will be more or less obscured at different places along the strip, *i. e.*, the quantity of light allowed by the transparent parts of the strip to pass through the slit will be increased or decreased, corresponding exactly to the pulsations of the diaphragm (or the sound waves,) not only in number and intensity, but also in the form or manner of vibrating.

At 2, Fig. 6, is seen a fine opaque line in the middle transparent strip. This is made by placing a fine wire across the center of the stationary slit m , to stop the light and indicate the center of the negative strip. Its convenience will be manifest. In practice the stationary notched shutter s^1 is not necessary, as the slit m is sufficient in connection with the vibrating notched shutter. These patterns or negatives, and others which can be made by the above described method, are suited for different uses. It is evident that when a correct negative is once obtained, perfect copies can be produced not

only by photographic but also by ordinary printing processes, or even by mechanical means, at a merely nominal cost, even for the most elaborate negatives.

Having thus explained the principles of the present invention, Fig. 7 represents an apparatus which has been devised for carrying out the method and producing the record. At A is a roll of the prepared negative strip, wound upon a bobbin, which is mounted in journal bearings in any convenient way. This strip may be of any suitable thin and flexible material, which may be strong fine paper, but what is known as paper parchment is preferred, although many other substances, may be used. It should be covered with a thin film made very sensitive to light, by any of the instantaneous processes employed in photography, although a dry process will be most convenient with this form of negative. After being properly coated and sensitized, it should be carefully dried, rolled up, and protected from light or damp till ready to use it. It may be thus coated and sensitized either before or after being cut up into strips of width suitable for use, but in the latter case care must be taken in the cutting not to disturb the adhesion of the film to the strip. A suitable width is $\frac{1}{2}$ or $\frac{3}{4}$ inch, and the length will of course be governed by convenience, or the choice of the operator.

The roll A is free to turn, being held only by the spring 1, pressing upon it sufficiently to prevent it from turning faster than the strip is needed. From A, the strip passes over the flanged rollers R R, Figs. 3, 4 and 7: at R^1 is a rubber-faced roller which presses the paper strip between itself and R, tightly enough to prevent the slipping of the strip. It also fits between the flanges of the roller enough to carry that along with it. If desired, it can also press lightly on the roller A^1 , to assist in rewinding the strip upon it. To this roller can be applied the power which feeds the strip along before the slit m in the screen or partition S. For experiment, or common telegraphic purposes, a crank may be attached to the roller R^1 or R, as shown in Fig. 7, or the strip may be otherwise fed by hand. But when accuracy is required, some motor should be employed which will give the negative a perfectly uniform and known rate of speed. These are not new, and need not be described, as they form no part of my invention. The motor may be attached to or contained in the box or frame of the phonograph, or otherwise connected, as preferred.

The strip being thus fed along at a uniform speed, it is wound upon a second roller A^1 , or may simply be fed loosely into the bottom of the box or case of the phonograph. It will now remain unchanged, if kept from light and damp, for days or even

weeks,—or, on the other hand, it may be at once developed, intensified, fixed, or otherwise treated, to render the image permanent,—according to the process employed or the effect desired. All of which will be at
 5 once understood by those versed in photography, who will be enabled, from the foregoing description, to readily make a negative strip having the characteristics required, and will probably prefer the gelatin-bromid process. If the paper seems to have a greasy nature, it may before applying the bromid emulsion, be coated with a
 10 4 per cent. solution of white of egg, to which sufficient chrome alum has been added to give it a slight bluish tinge. This will insure the film adhering perfectly, but it will seldom be required if a good quality of paper or parchment is used. These strips being fixed, they may be treated and used in
 15 different ways. The parts acted upon by light may be made transparent, and the rest blacked and rendered more opaque, and the strip used by transmitting light through it; or the strip may be left opaque, and used
 20 by reflected light,—in which case the parts acted upon by light should be made as white or brilliant, and those yet not acted upon as black and absorbent of light as possible, all of which can be done by any one out of
 25 many well known ways, and detailed directions are not necessary. For example, a strip to be used by transmitted light may have the dark parts blacked with carbon ink, flexible black varnish, or otherwise, and the
 30 lights rendered transparent by dipping in castor oil thinned with absolute alcohol.

The finished strip being again wound upon the wheel or roller A and properly arranged in the phonograph, we can reproduce the original variations in the first beam of light, in another beam of light, by feeding the strip before the slit *m* at the same speed as when making the negative, and
 40 throwing the beam of light through it as it passes the slit. To do this, the diaphragm *d* with its shutter is removed,—the upright frame which holds it being arranged to slide on a foot-piece which fits in grooves, so that it may be slid into its place for use
 45 or moved back out of the way, as desired. The square chamber which contained the diaphragm is now empty or free, and allows the light *l* to shine unobstructed across it, to and through the slit *m*, onto and through
 50 the strip which is rapidly fed before it, whereby the light which passes through the strip is varied in precisely the same manner as the original beam of light was varied
 55 by the shutter on the diaphragm D; *i. e.*, the greater the proportion of the strip which is transparent, the longer the beam of light which is passed through it, and vice versa, (see Fig. 4). This light can now be used
 60 to produce corresponding variations or pul-

sations in sound, electric currents, magnetic attractions, etc., as desired. This varying light can be converted into sounds in different ways. It may be passed through a plano-convex or rather plano-cylindrical
 70 lens *p'*, or any suitable optical device, to widen and disperse it properly, and be thrown directly upon a thin, hard-rubber diaphragm D, properly arranged for speaking or giving out sounds. Or, in place of
 75 the lens *p'*, a selenium bar or cell may be arranged to receive the light and thereby vary a current of electricity flowing through it, as shown at *p* in Fig. 11, which current may then be conducted to a suitable telephone, which is substituted for the diaphragm D, and the sounds will be produced
 80 by it with any desired loudness. Or the current may be conducted by wire to any other instrument or place, in the same way as in telegraphy, and there converted into sounds or utilized for any other purpose, as in Fig. 11, where a current from D is represented as conveyed to a telephone T' at one place and to an electrical receiver of any suitable
 85 kind E' at another place.

When selenium is used for receiving the light and varying an electric current, it may be either in the shape of a bar *p*, covering the slit *m*, as shown in Figs. 9 and 11 or
 90 that of a flat cell *p'*, in Fig. 10, where the light passing through the negative or pattern P and the slit *m* is converged by the lens *p* to a focus upon the selenium cell *p'*.

The negative may of course be taken on glass, instead of paper, and arranged to be properly moved before the slit and light. Any suitable material may be used, whether transparent or opaque, flexible or rigid,
 100 plane or curved. When the negative strip is required to be very narrow, in order to save room, instead of the light falling directly upon it, the varying light beam may be received upon a lens and converged to the desired size before being thrown upon
 105 the sensitive surface. The negative, in Fig. 7, would then be fed along at D, instead of between *p* and *m*. Or, in Fig. 10, the negative would be at *p'* while receiving the photographic impression. Fig. 16 illustrates this arrangement. The light from *l*, after being varied by the shutter *s* passes through the slit *m* and is converged by the lens *p* and then falls upon the negative P. Of course, the same arrangement may be used with a speaking diaphragm D or other
 110 suitable device substituted for the negative or sensitive surface. As the interior of the camera is thoroughly blacked, as already stated, it absorbs all superfluous light and improves the effect.

When using an opaque strip or negative, the sound waves, or, rather, the variations of light produced by them, are recorded in the same way as already described, but to
 120 125 130

reproduce those variations, the strip is fed along with the printed or formerly sensitive side outward, in the path of a beam of light, by which it is powerfully illuminated, and the light reflected from it is utilized instead of transmitted light. Fig. 8 shows the arrangement: l is the light, which passes through the alum-water cell 2, through the tube 3, and illuminates the moving strip 4. 5 is a tube with blackened interior, each end having an aperture corresponding to the slit m , and so directed toward the strip that only the light from that part of the strip which would be covered by the slit m can pass through both apertures,—all of which will be readily understood by photographers. This light is then received by the lens, or other suitable optical device, p , and properly thrown upon the diaphragm D, as before. Or the lens p may be replaced by the selenium bar or cell, and the diaphragm D by one of my telephones, etc., exactly as before described for transmitted light. The distance of the illuminating arrangement from the negative strip is merely sufficient to thoroughly light up the field covered by the tube 5. Tubes 4 and 5 may be of any suitable size, length, and material, all of which may be left to the judgment of the operator, who should arrange the apparatus according to good photographic practice.

Instead of a negative arranged as before described, it may be made alike across its whole width and its transparency varied so as to be more or less opaque at different parts of its length. Or an opaque strip may be similarly varied from white through all the shades to black so that a given cross-section of the strip will reflect more or less light at different points. Such strips will light up the whole length of the selenium or other device all the time and operate by the varying intensity of the light instead of by varying the length of the cell exposed to light. Or the strip can be so prepared as to show analogous gradations of phosphorescence, when suitably treated, and throw out a light of greater or less strength corresponding to the variations in the beam of light originally employed in making the negative whereby it will be enabled to reproduce those variations at any time, which is the object and function of the negative or "pattern". Or, the desired effect can be attained in many other ways.

The pattern may be made upon a long narrow strip, as described, or arranged spirally over the surface of a plate as in Fig. 12 or a cylinder of any suitable size, shape, and material as in Fig. 13. By making it in a circular form, as in Figs. 14 and 15 and running it around, it will continue to repeat the same sound, word, or phrase, as long as it is turned.

Instead of the hard-rubber diaphragm D,

one of celluloid may be used, also soft vulcanized rubber, thin elastic brass and german silver, and other materials. The diaphragm d may be made of any of the materials used in telephony, which are suitable for the employment to be made of it in this process.

The light employed for making the negative should be strongly actinic, and may be direct sun light, or electric or other artificial light having sufficient actinic power for instantaneous photography. It should be arranged in a chamber W, preferably with a reflector or other means for making the rays nearly parallel. At 2, Fig. 7, they pass through a glass cell filled with alum water, to stop the heat without diminishing the light. They then pass through an aperture of suitable size, across the diaphragm chamber, where they are manipulated by the shutter s , and through the slit m , as already described. For using the negative, so strong a light will not always be needed, and a good kerosene lamp will answer for most ordinary purposes. Gas light is not suitable, unless a steady flame can be obtained, as a flickering light will interfere with the perfection of the speaking. For purposes requiring accuracy, however, a light should be used having ample actinic power, and the stronger the better. No harm can be done by having a light unnecessarily strong as it cannot be strong enough to do any harm.

The whole apparatus is inclosed in a close box or casing, as shown in Figs. 7, 11, 16 and 17, to exclude external light, particularly from the negative. The light chamber W should be so tight that none of the light can penetrate the partitions around it, except through the cell 2. The diaphragm chamber is also inclosed on all sides except the one facing the sounds to be recorded, and the only opening on that side is through the bell or mouth-piece conducting the sound to the center of the diaphragm. All the interior surfaces are made densely black, in order to absorb and prevent the reflection of any light that may find its way inside. Suitable openings or doors are provided wherever necessary, for giving access to the different parts, which may be arranged to suit the convenience of the operator. This care about the light is required more especially while making the negative. For speaking purposes much less caution is needed.

By suitably attaching the expansion wires of my telephone to the diaphragm d of the phonograph instead of to its own diaphragm d , my phonograph will make negatives of the sounds or signals transmitted to it over the line in connection with the telephone. This arrangement is shown in Fig. 11 (also in Fig. 17). The telephone is designated by El , the base of which slides in the cleats

$t t$ to the position shown by the dotted lines at its ends.

$c c$ are the suspension wires running to the cross piece u which is attached to the diaphragm d which is carried by the base of the telephone and, consequently, moves with the binding posts at the other ends of the wires $c c$ when the diaphragm and shutter are to be moved back out of the way—thus avoiding any disarrangement of the telephonic adjustments thereby.

T is the telephone telegraphic instrument or other apparatus which transmits sounds, electrical impulses, or signals from a distance to the telephonic devices EZ by means of which those influences are enabled to actuate the phonograph and produce records or "patterns" thereof as already described. The same apparatus EZ can, of course, be employed for transmitting messages, etc., as well as for receiving them.

The phonograph can, therefore, remain in the office and the speech, music, or signals be transmitted to it by telephone for record and preservation.

Fig. 18 shows the general arrangement of the apparatus in more detail than Fig. 7. When in use the works are shut in by tight doors, as in Fig. 20, where O is the mouth piece through which vocal or other sounds are thrown on the diaphragm D . This mouth piece may be a deep bell-shaped cavity directly over the diaphragm or be fitted to the face and be connected by a tube ending over the diaphragm. The effect is much increased by having the mouth piece fit closely to the face of the speaker. EZ represents an electrical apparatus capable of vibrating the diaphragm D when a telephonic, telegraphic or other suitable current is passed through it and thereby vibrating the shutter s placed in the path of the beam of radiant rays from l here shown as an electric lamp, and thus varying said beam in accordance with the extent and character of its own movements. The beam thus varied is in the first instance thrown upon the sensitized strip P fed down from reel A over guide roller R before the opening or slit m on to another reel A' . The strip having been properly treated to bring out and fix the image thus obtained and render it suitable for use as a pattern, as before described, it is again wound upon reel A and its end hooked to reel A' . The apparatus EZ is moved back far enough to take shutter s out of the beam of radiant rays which then pass through the negative and are varied thereby as they had been previously varied by the shutter s , after which they fall upon a selenium cell or other suitable apparatus p' , all as heretofore explained.

Fig. 19 is a horizontal section through the lines $x-x$ of Fig. 18, showing the light

and lenses l , alum cell 2, shutter s , cylindrical lens p which converges the light laterally to a long narrow streak where it passes through the opening m to strip P . The set-screws $t' t'$ adjust the forward position of the block t^2 on apparatus EZ to bring the shutter s to the right point. p^2 is a small selenium cell which serves to automatically start off the strip P when the phenomenon occurs which is to be recorded. The shutter s is caused to vibrate, as already stated, and thereby uncovers the cell p^2 , allowing the light which had previously been stopped by the shutter to fall upon the cell and by increasing its conductivity an electric impulse is sent through the starting magnet M' . This immediately pulls up the armature and lever L and raises the pawl which had previously held the reel A' , whereupon the reel is suddenly revolved and draws the strip P past opening m until the sound or other phenomena ceases, when the shutter becomes still, the current substantially ceases to flow through the cell p^2 and magnet M' , the lever L drops and the reel A' is stopped. When reproducing the recorded phenomena the lever L is lifted manually by a cord a running over a pulley through an aperture to the outside at some accessible point, where it can be pulled when desired. The current of the cell p^2 can also be sent through induction coil I and transmit the message if desired to a telephone T at the same time that it is being recorded on P .

The shutter may be attached directly to the center of the diaphragm, or at the end of a light lever, as in Fig. 18 pivoted in a bar or support b . The diaphragm being connected to the short arm of the lever a greatly increased motion of the shutter is obtained.

What is claimed is:

1. The combination with a source of light rays, of a photo-sensitive surface, means for moving said surface across said light rays, and means for controlling the intensity of said rays reaching said surface at different points longitudinally of the surface by and in accordance with sound waves whereby a record varying in density longitudinally will be produced.

2. A sound record varying in density longitudinally in accordance with sound waves.

3. A photographically produced sound record having a coating or surface varying in density longitudinally of the record in accordance with sound waves.

4. A photographically produced sound record having a coating or surface of substantially uniform width varying in light transmitting capacity at different points longitudinally of the record in accordance with sound waves.

5. A sound record consisting of a record blank having a record thereon of substantially uniform width varying in light transmitting capacity longitudinally of the
5 record in accordance with sound pulsations and capable of reproducing the sound.

6. A sound record consisting of a record blank photographically affected with varying intensity longitudinally of the record
10 line in accordance with sound pulsations and capable of reproducing the sound.

7. The combination with a source of light rays, of a photo-sensitive surface, means for moving said surface across said light rays, and means for controlling the intensity of the rays reaching said surface independently of their lateral position by and in accordance with sound waves.
15

8. The combination with a movable photo-sensitive surface, of means for moving it, means for directing a stationary beam of light upon said surface, and means for cutting off more or less of the rays constituting said beam transversely of the line
20 of movement of said surface by and in accordance with sound waves whereby a record varying in density longitudinally will be produced.
25

9. In a device of the class described, the combination with a movable photo-sensitive surface, of means for moving it, means for directing a stationary beam of light upon said surface, a speaking diaphragm, and a shutter carried by said diaphragm
30 with its edge arranged transversely of the line of movement of said record surface adapted to cut off the rays of said beam reaching said surface by and in accordance with the sound pulsations of said diaphragm.
40

10. The process of making sound reproducing records which consists in directing a fixed beam of light upon a moving photo-sensitive surface, cutting off the rays of said

beam transversely of the line of movement of said surface by and in accordance with sound waves and developing and fixing said record. 45

11. A pattern of sound pulsations varying in density longitudinally in accordance with sound waves and capable of use as a master record in producing therefrom commercial copies capable of reproducing the original pulsations of sound. 50

12. A pattern or negative photographically affected in a line varying in density longitudinally in accordance with sound pulsations and capable of use as a master record in producing therefrom commercial copies capable of reproducing the original
55 pulsations in sound. 60

13. The process of making sound reproducing records which consists in photographically affecting a sensitive surface with varying intensity longitudinally in accordance with sound pulsations. 65

14. The process of making sound reproducing records which consists in photographically affecting a sensitive surface with varying intensity longitudinally in accordance with sound pulsations, and so treating said record as to render the varying effects fixed and more pronounced. 70

15. The process of making sound reproducing records which consists in photographically affecting a sensitive surface with varying intensity longitudinally in accordance with sound pulsations, and making from the record so produced commercial sound records. 75 80

In testimony whereof I affix my signature in presence of two witnesses.

JOSEPHINE H. FRITTS,
Administratrix of the estate of Charles Edgar Fritts, deceased.

Witnesses:

GEORGE L. GIBBS,
FRANCES E. FRITTS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

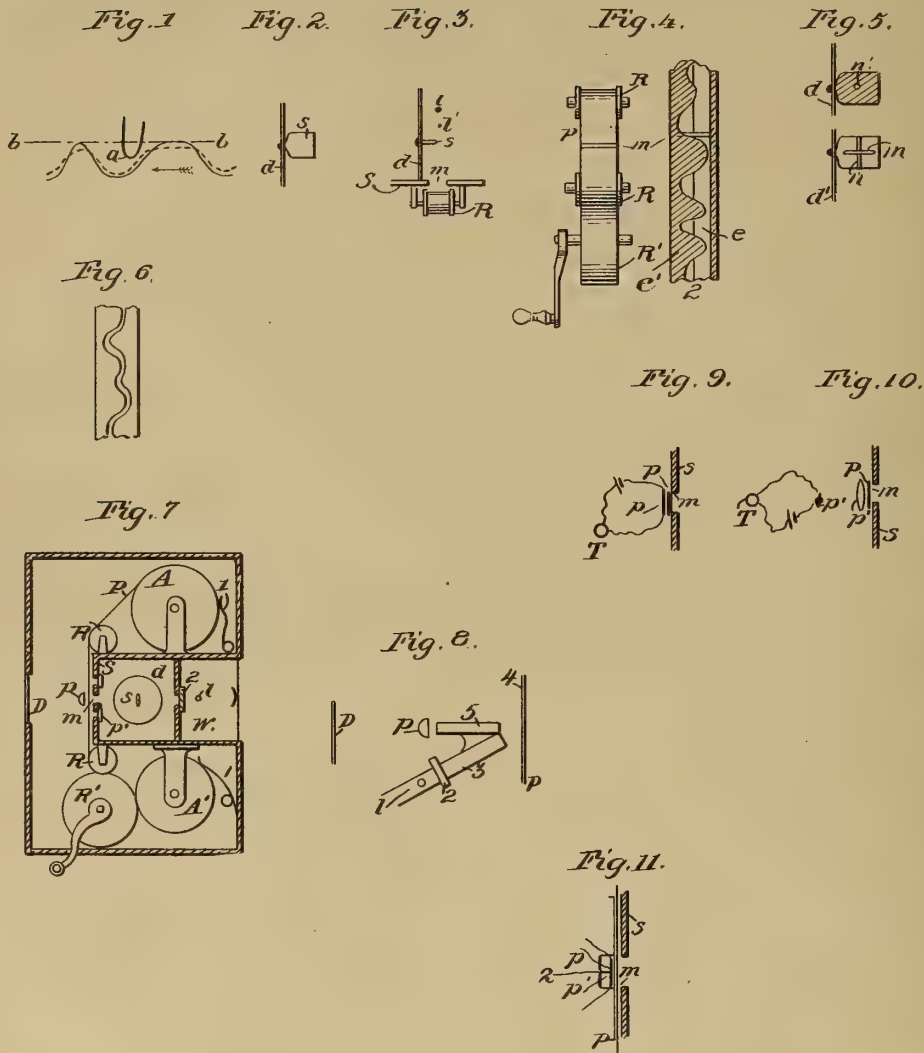
APPARATUS FOR MAKING SOUND
RECORDS.

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Patented-January 23rd, 1917.
Filed-January 22nd, 1912.

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APPLICATION FILED JUNE 22, 1912.

1,213,615.

Patented Jan. 23, 1917.
3 SHEETS—SHEET 1.



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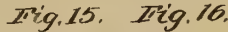
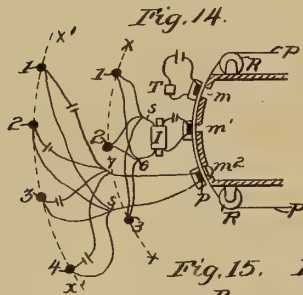
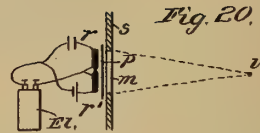
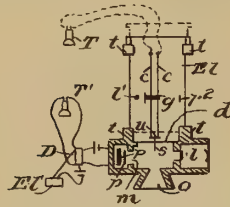
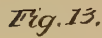
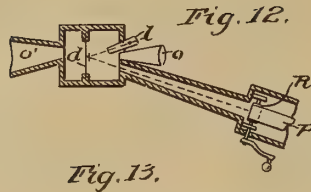
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1,213,615.

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3 SHEETS—SHEET 3.

Fig. 21.

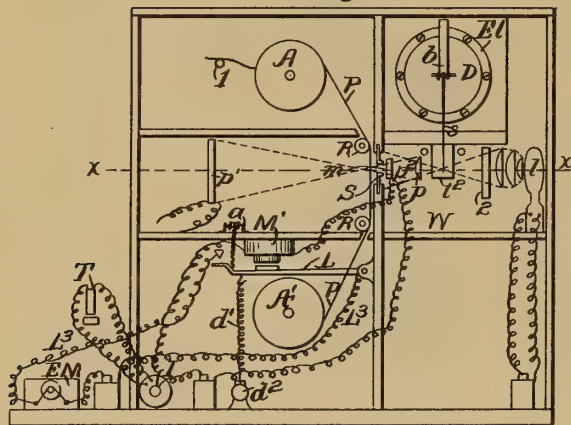


Fig. 22

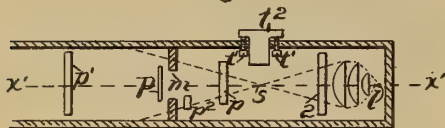
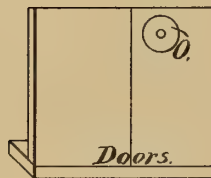


Fig. 23.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR MAKING SOUND-RECORDS.

1,213,615.

Specification of Letters Patent.

Patented Jan. 23, 1917.

Original application filed October 22, 1880, Serial No. 19,313. Divided and this application filed June 22, 1912. Serial No. 705,349.

To all whom it may concern:

Be it known that CHARLES EDGAR FRITTS, now deceased, but formerly a citizen of the United States residing at Oneonta, in the county of Otsego and State of New York, did invent a new and useful Improvement in Apparatus for Making Sound-Records, of which the following is a specification.

This invention relates to recording variations or pulsations in sounds, light or electric currents in a permanent or tangible form and reproducing the same at will not merely at the instrument alone, but also at any other instrument suitably connected therewith.

The present application is a division of the original application, Serial No. 19,313, filed October 22, 1880, and relates to one of the forms of record shown and described in said original application.

The present invention includes the application of photography and electricity for recording and reproducing the variations or pulsations above mentioned by the aid of a diaphragm or equivalent device capable of vibrating under those influences, and particularly under the influence of sounds as hereinafter fully set forth. For convenience of description the apparatus disclosed will be called a phonograph, but it is to be expressly understood that it is not the intention to limit the scope of the invention to what is commonly known as or done by the so-called phonographs or to narrow or restrict the scope of the invention in any way, but the term is used merely for convenience.

The novel features of the invention will be apparent from the following description taken in connection with the accompanying drawings.

In the drawings, Figure 1 is a diagrammatic view illustrating the defective result of attempting to produce a phonograph record by indenting the blank. Fig. 2 is an edge view of a speaking diaphragm having a shutter mounted thereon such as may be used in carrying out the invention. Fig. 3 is a view partly broken away showing a speaking diaphragm carrying a shutter, a source of light and a roller carrying a sensitive strip exposed to said light through an opening controlled by said shutter. Fig. 4 shows at the left a plan view of the sensi-

tive strip and rollers and at right an enlarged plan view of a portion of the strip having the photographic record thereon. Fig. 5 shows two forms of shutter mounted on diaphragms which may be used in carrying out the present invention. Fig. 6 is a plan view of a strip having thereon a sinusoidal record produced by the shutter shown in Fig. 5. Fig. 7 is a vertical sectional view of one form of apparatus arranged for making the negative or pattern and moving it along by hand in carrying out the invention. Fig. 8 is a diagrammatic view showing means for reproducing and utilizing an opaque record by reflected light. Fig. 9 shows an electric circuit having a selenium bar therein adapted to be affected by light from the record. Fig. 10 is a similar view showing a flat selenium cell with a lens for concentrating the light from the record on it. Fig. 11 shows two selenium cells arranged for exposure through a single opening to produce alternating current. Fig. 12 is a sectional view of an apparatus having a mirror on the speaking diaphragm for reflecting light to the record surface. Fig. 13 is a sectional view of an apparatus which may be used either for making or utilizing the record. Fig. 14 is a view in detail of a plurality of means for utilizing a single record. Fig. 15 is a plan view of a disk record having the photographic impressions thereon in a spiral. Fig. 16 is a perspective view of a cylinder having a spiral record thereon. Fig. 17 is another form of record having thereon a single circular pattern. Fig. 18 is still another form showing separate parallel patterns. Fig. 19 is a sectional view of an apparatus for taking and reproducing the record having a lens for concentrating the light upon the strip. Fig. 20 is similar to Fig. 11 showing the electrical connections more clearly. Fig. 21 is a general view of the apparatus disclosed in Fig. 7 but more in detail showing more clearly the arrangement and connection of the parts. Fig. 22 is a horizontal section on the line $x-x$. Fig. 23 is a perspective view of the doors for the apparatus shown in Fig. 21.

The great trouble with phonographs heretofore is that they have undertaken to record and reproduce delicate air pulsations

by crude and clumsy mechanical means. In the operation of the methods heretofore used the metal point used for indenting the record is hindered in its vibrations by the labor of impressing its motion in the foil or other material used in its place. This resistance not only retards the diaphragm itself, but it retards it in a very variable manner. When the tracer point reaches a soft, thin or unsupported spot in the foil it moves farther than the average, while thick or hard spots, reduce the motion below the average. A score of other faults could be mentioned, but the most important is that when the point is descending, the pressure of the foil against its inclined forward surface retards the motion of the diaphragm; but when ascending, it hastens or assists it, thus deforming the vibrations of the diaphragm itself. This will be understood by examining Fig. 1, where *a* is the tracer point, with its front surface inclined backward to prevent clogging. The dotted line *b b* represents the original level of the foil, which is fed along in the direction of the arrow, and the solid curved line shows the actual form of a supposed sound wave, while the dotted curve shows the form which the point will tend to make,—and this discrepancy will be aggravated by the stiffness of the foil, the weakness of the vibration or the spring of the tracer, and many other causes.

The present invention is designed as one means for obviating the difficulties above described and this is accomplished by dispensing entirely with the tracer and its spring and the foil or any substitute for it, or any mechanical pressure devices whatever, for recording the sound waves tangibly. The present invention employs means for recording the vibrations of the diaphragm which neither retard nor accelerate them, but will truly record the most extreme or violent, or the gentlest pulsations, and every one exactly as it occurred. This is done by causing the diaphragm as it vibrates to vary a light which passes through an aperture to a surface sensitive to light by which the sound waves are fixed and recorded. No matter how many or how different the sounds which are joined in producing the composite sound waves which strike the diaphragm, the true number and intensity of every one of them will thus be preserved unchanged by the process of recording. This record is called the negative and from it can be produced copies or duplicates in the same or other materials and they can be used for the reproduction of the sounds recorded thereon.

The record of sound after it is produced as above described is utilized to operate a speaking diaphragm by throwing upon it light which has been varied correspondingly with the form of the sound waves re-

corded as before described which, as is known, causes the diaphragm to vibrate and produce the sounds corresponding to those waves. To accomplish this a powerful beam of light is passed through the negative previously prepared to and upon the diaphragm. This light passes through a narrow slit corresponding to the one used in making the negative, and by moving the negative along behind this slit at the same speed as when making the negative, it is evident that the original variations in the intensity of the light are exactly reproduced, and if they are thrown upon the diaphragm it will give out the same sound as that which originally caused it to vibrate. Thus, instead of trying to shove the diaphragm back and forth by machinery some hundreds or thousands of times per second, at a constantly varying speed, and making each motion exactly according to a prescribed pattern, each one of which may be different from any of the others, the same end in the present invention is accomplished by the slow motion of a single piece or negative, and causing that to control the action of a beam of light directed upon the diaphragm.

Instead of the light beam passing through a transparent negative, it may be thrown upon an opaque negative and the image of the pattern be reflected therefrom and utilized, or the intensity of the light thrown upon the diaphragm may be automatically varied by the negative in many other ways.

In making the negatives, the sound to be recorded is caused to impinge upon a vibrating diaphragm, which is properly damped and arranged, as will be readily understood by those versed in telephony. To the center of the diaphragm *d*, Fig. 2, is fixed a vertical screen or shutter *s* of mica or other light and stiff material, secured at the center of its edge to the diaphragm, and its inner corners being rounded off a little to prevent their contact with the diaphragm during its backward vibrations, or to the left. It projects out at right angles to the plane of the diaphragm, and in this particular form is made opaque to prevent the passage of any light through it. Fig. 3 is a vertical plan view; *s* is the shutter, *d* the diaphragm, *l* is a powerful light throwing a beam of nearly parallel rays across to the screen or partition *S*, which has a long, narrow slit *m* in it, through which the light passes and strikes the prepared surface, which in this case is represented as a strip of sensitized paper, fed at a regular speed over the rollers *R, R*. As the diaphragm shutter *s* in this form normally stands, its edges shut the light off from one-half of the slit, and in vibrating it covers up more or less of the strip, according to the extent of the vibrations. The paper strip being carried along behind the slit *m*, Fig. 4, the edge of the

shutter will describe a curved line at the junction of the part e^1 , not acted upon by the light, and e , which is acted upon, and by proper treatment the latter may be dissolved away or otherwise made transparent, in any well known way, as will at once be understood by photographers.

By varying the relative distances of the light, the shutter, and the slit or sensitive surface from each other, the apparent amplitude of the sound waves as recorded on the sensitive surface, can be increased without changing their forms. In Fig. 3, two positions of the light are shown marked l and l' . This method of amplifying the vibrations is often important, and can be applied for strengthening pulsations or variations in light or electrical currents, as well as in sounds.

If, instead of an opaque shutter on the diaphragm, we leave a vertical transparent strip across said shutter, the light will reach the paper strip behind the screen only through the intersection of the two slits in front of it, forming merely a square spot of light, as shown by Fig. 5 at the intersection of the two slits n and m . The vertical slit on the mica should make the light beam of about the same width as the stationary horizontal slit in the screen. As the diaphragm vibrates and the paper is moved along, we produce (after dissolving out the parts exposed to light, blacking the rest, soaking in oil or otherwise rendering it transparent), a narrow transparent curve on the paper strip, as represented in Fig. 6. Instead of the vertical strip, we may use a transparent spot, at the point which will fall on the center of the stationary slit when the diaphragm is still, as seen at n' on the upper shutter shown in Fig. 5. This, also, makes a negative strip like Fig. 6.

These patterns or negatives, and others which can be made by the above described method, are suited for different uses. It is evident that when a correct negative is once obtained, perfect copies can be produced not only by photographic but also by ordinary printing processes, or even by mechanical means, at a merely nominal cost, even for the most elaborate negatives.

Having thus explained the principles of the present invention, Fig. 7 represents an apparatus which has been devised for carrying out the method. At A is a roll of the prepared negative strip, wound upon a bobbin, which is mounted in journal bearings in any convenient way. This strip may be of any suitable thin and flexible material, which may be strong fine paper, but what is known as paper parchment is preferred, although many other substances may be used. It should be covered with a thin film made very sensitive to light, by any of the instantaneous processes employed in photography,

although a dry process will be most convenient with this form of negative. After being properly coated and sensitized, it should be carefully dried, rolled up, and protected from light or damp till ready to use it. It may be thus coated and sensitized either before or after being cut up into strips of width suitable for use, but in the latter case care must be taken in the cutting not to disturb the adhesion of the film to the strip. A suitable width is $\frac{1}{2}$ or $\frac{3}{4}$ inch, and the length will of course be governed by convenience, or the choice of the operator.

The roll A is free to turn, being held only by the spring 1, pressing upon it sufficiently to prevent it from turning faster than the strip is needed. From A, the strip passes over the flanged rollers R R, Figs. 3, 4 and 7; at R' is a rubber-faced roller which presses the paper strip between itself and R, tightly enough to prevent the slipping of the strip. It also fits between the flanges of the roller enough to carry that along with it. If desired, it can also press lightly on the roller A', to assist in rewinding the strip upon it. To this roller can be applied the power which feeds the strip along before the slit m in the screen or partition S. For experiment, or common telegraphic purposes, a crank may be attached to the roller R' or R, as shown in Fig. 7, or the strip may be otherwise fed by hand. But when accuracy is required, some motor should be employed which will give the negative a perfectly uniform and known rate of speed. These are not new, and need not be described, as they form no part of my invention. The motor may be attached to or contained in the box or frame of the phonograph, or otherwise connected, as preferred.

The strip being thus fed along at a uniform speed, it is wound upon a second roller A', or may simply be fed loosely into the bottom of the box or case of the phonograph. It will now remain unchanged, if kept from light and damp, for days or even weeks,—or, on the other hand, it may be at once developed, intensified, fixed, or otherwise treated, to render the image permanent,—according to the process employed or the effect desired; all of which will be at once understood by those versed in photography, who will be enabled, from the foregoing description, to readily make a negative strip having the characteristics required, and will probably prefer the gelatin-bromid process. If the paper seems to have a greasy nature, it may before applying the bromid emulsion, be coated with a 4 per cent. solution of white of egg, to which sufficient chrome alum has been added to give it a slight bluish tinge. This will insure the film adhering perfectly, but it will seldom be required if a good quality of paper or parchment is used. These strips

being fixed, they may be treated and used in different ways. The parts acted upon by light may be made transparent, and the rest blackened and rendered more opaque, and the strip used by transmitting light through it; or the strip may be left opaque, and used by reflected light,—in which case the parts acted upon by light should be made as white or brilliant, and those not yet acted upon as black and absorbent of light as possible, all of which can be done by any one out of many well known ways, and detailed directions are not necessary. For example, a strip to be used by transmitted light may have the dark parts blackened with carbon ink, flexible black varnish, or otherwise, and the light parts rendered transparent by dipping in castor oil thinned with absolute alcohol.

The finished strip being again wound upon the wheel or roller A and properly arranged in the phonograph, we can reproduce the original variations in the first beam of light, in another beam of light, by feeding the strip before the slit *m* at the same speed as when making the negative, and throwing the beam of light through it as it passes the slit. To do this, the diaphragm *d* with its shutter is removed,—the upright frame which holds it being arranged to slide on a foot-piece which fits in grooves, so that it may be slid into its place for use or moved back out of the way, as desired. The square chamber which contained the diaphragm is now empty or free, and allows the light *l* to shine unobstructed across it, to and through the slit *m*, onto and through the strip which is rapidly fed before it, whereby the light which passes through the strip is varied in precisely the same manner as the original beam of light was varied by the shutter on the diaphragm *d*; *i. e.*, the greater the proportion of the strip which is transparent, the longer the beam of light which is passed through it, and vice versa, (see Fig. 4). This light can now be used to produce corresponding variations or pulsations in sound, electric currents, magnetic attractions, etc., as desired.

This varying light can be converted into sounds in different ways. It may be passed through a plano-convex or rather plano-cylindrical lens *p*, or any suitable optical device, to widen and disperse it properly, and be thrown directly upon a thin, hard-rubber diaphragm D, properly arranged for speaking or giving out sounds. Or, in place of the lens *p*, a selenium bar or cell may be arranged to receive the light and thereby vary a current of electricity flowing through it, as shown at *p* in Fig. 9, which current may then be conducted to a suitable telephone, which is substituted for the diaphragm D, and the sounds will be produced

by it with any desired loudness. Or the current may be conducted by wire to any other instrument or place, in the same way as in telegraphy, and there converted into sounds or utilized for any other purpose, as in Fig. 13, where a current from D is represented as conveyed to a telephone T' at one place and to an electrical receiver of any suitable kind E' at another place.

When selenium is used for receiving the light and varying an electric current, it may be either in the shape of a bar *p*, covering the slit *m*, as shown in Figs. 9 and 13 or that of a flat cell *p*¹, in Fig. 10, where the light passing through the negative or pattern P and the slit *m* is converged by the lens *p* to a focus upon the selenium cell *p*¹, or for producing an intermittent current it may consist of two selenium cells or bars suitably arranged, as shown in Fig. 11, and described hereinafter. In either case, the electric current is arranged to flow through the selenium by proper conducting wires, and the varying quantity of light which falls upon the selenium will correspondingly vary the current flowing through it, as is well known to electricians. The two cells, Fig. 11, are arranged end to end with their approximating ends at the central line 2 of the pattern strip so that one cell or bar is opposite one-half of the slit *m* and the other bar or cell opposite the other half. Each cell is arranged to send whatever current flows through it in a direction opposite to that of the current from the other cell, in any well-known or suitable manner and each may be supplied with its current from different ends or sections of the same battery or from separate batteries, as shown in Fig. 20, where the two sections of the selenium are inserted in derived circuits or branches of the main circuit. In either case, the electric current is arranged to flow through the selenium by proper conducting wires and the varying quantity of light which falls upon the selenium will correspondingly vary the current flowing through it, as is well known to electricians.

The negative may of course be taken on glass, instead of paper, and arranged to be properly moved before the slit and light. Any suitable material may be used, whether transparent or opaque, flexible or rigid, plane or curved. When the negative strip is required to be very narrow, in order to save room, instead of the light falling directly upon it, the varying light beam may be received upon a lens and converged to the desired size before being thrown upon the sensitive surface. The negative, in Fig. 7, would then be fed along at D, instead of between *p* and *m*. Or, in Fig. 10, the negative would be at *p*¹.

When using an opaque strip or negative, the sound waves, or, rather, the variations

of light produced by them, are recorded in the same way as already described. But, to reproduce those variations, the strip is fed along with the printed or formerly sensitive side outward, in the path of a beam of light, by which it is powerfully illuminated, and the light reflected from it is utilized instead of transmitted light. Fig. 8 shows the arrangement: *l* is the light, which passes through the alum-water cell 2, through the tube 3, and illuminates the moving strip 4. 5 is a tube with blackened interior, each end having an aperture corresponding to the slit *m*, and so directly toward the strip that only the light from that part of the strip which would be covered by the slit *m* can pass through both apertures,—all of which will be readily understood by photographers. This light is then received by the lens, or other suitable optical device, *p*, and properly thrown upon the diaphragm D, as before. Or the lens *p* may be replaced by the selenium bar or cell, and the diaphragm D by one of the telephones, etc., exactly as before described for transmitted light. The distance of the illuminating arrangement from the negative strip is merely sufficient to thoroughly light up the field covered by the tube 5. Tubes 4 and 5 may be of any suitable size, length, and material, all of which may be left to the judgment of the operator, who should arrange the apparatus according to good photographic practice.

The pattern may be made upon a long narrow strip, as described, or arranged spirally over the surface of a plate as in Fig. 15 or a cylinder of any suitable size, shape, and material as in Fig. 16. By making it in a circular form, as in Figs. 17 and 18 and running it around, it will continue to repeat the same sound, word, or phrase, as long as it is turned.

Instead of the hard-rubber diaphragm D, one of celluloid may be used, also soft vulcanized rubber, thin elastic brass and German silver, and other materials. The diaphragm *d* may be made of any of the materials used in telephony, which are suitable for the employment to be made of it in this process.

The light employed for making the negative should be strongly actinic, and may be direct sun light, or electric or other artificial light having sufficient actinic power for instantaneous photography. It should be arranged in a chamber W, preferably with a reflector or other means for making the rays nearly parallel. At 2, Fig. 7, they pass through a glass cell filled with alum water, to stop the heat without diminishing the light. They then pass through an aperture of suitable size, across the diaphragm chamber, where they are manipulated by the shutter *s*, and through the slit *m*, as already

described. For using the negative, so strong a light will not always be needed, and a good kerosene lamp will answer for most ordinary purposes. Gas light is not suitable, unless a steady flame can be obtained, as a flickering light will interfere with the perfection of the speaking. For purposes requiring accuracy, however, a light should be used having ample actinic power, and the stronger the better. No harm can be done by having a light unnecessarily strong as it cannot be strong enough to do any harm.

The whole apparatus is inclosed in a close box or casing, as shown in Figs. 7, 12, and 13, to exclude external light, particularly from the negative. The light chamber W should be so tight that none of the light can penetrate the partitions around it, except through the cell 2. The diaphragm chamber is also inclosed on all sides except the one facing the sounds to be recorded, and the only opening on that side is through the bell or mouth-piece conducting the sound to the center of the diaphragm. All the interior surfaces are made densely black, in order to absorb and prevent the reflection of any light that may find its way inside. Suitable openings or doors are provided wherever necessary, for giving access to the different parts, which may be arranged to suit the convenience of the operator. This care about the light is required more especially while making the negative. For speaking purposes much less caution is needed.

Fig. 11 represents the arrangement for transmitting signals by the phonograph records above described, except that the strip or negative P is fed past the slit *m* transversely, instead of lengthwise of it, as it would appear to be in the drawing. *m* is the narrow slit, long enough to cover the length of the two selenium bars *p* and *p*¹, each being inclosed and protected from all light except that which passes through the slit and the negative strip P. Each bar has proper wires to conduct the current through it, which are so connected up that each bar directs the current which flows in it through the line in an opposite direction, and their resistances are such that no current (or a very slight one) flows through either of them as long as they are kept in the dark. But immediately that the negative strip admits light to either bar, its resistance is lessened, and the current flows through that bar to the line, or to the primary coil of an inductorium which sends the induced current to line, or to any other devices, as the case may be,—the strength of the current being in proportion to the length of the bar thereby exposed to the light.

The electrical connections are more fully shown in Fig. 20 or they may be arranged in any other suitable or well known manner. The longer the transparent part of the strip or signal, the more of the bar is lighted up,

and the stronger the current which flows through it. When the other bar is illuminated, the same effect is produced, but the current is sent through the line or circuit in the opposite direction,—all of which will be readily comprehended and effected by electricians.

Fig. 21 shows the general arrangement of the apparatus in more detail than Fig. 7.

When in use the works are shut in by tight doors, as in Fig. 23, where O is the mouth piece through which vocal or other sounds are thrown on the diaphragm D. This mouth piece may be a deep bell-shaped cavity directly over the diaphragm or be fitted to the face and be connected by a tube ending over the diaphragm. The effect is much increased by having the mouth piece fit closely to the face of the speaker.

In Fig. 21, means for automatically controlling the recording mechanism is shown, and it embodies a pivoted lever L carrying a catch to hold the roller A' against rotation. This lever is raised to release the roller by means of the magnet M' in circuit with the selenium p^2 and this lever has secured to it a spring d' fastened to the casing d^2 tending to normally hold the lever down in engagement with the roller. A motor EM has circuit connections L^3 leading to opposite ends of lever L and the circuit through the lever is completed when it is raised. An induction coil I is also in circuit with the selenium and it includes the telephone T for reproducing the sound while it is being recorded on the strip P.

EL represents an electrical apparatus capable of vibrating the diaphragm D when a telephonic, telegraphic or other suitable current is passed through it and thereby vibrating the shutter s placed in the path of the beam of radiant rays from l here shown as an electric lamp, and thus varying said beam in accordance with the extent and character of its own movements. The beam thus varied is in the first instance thrown upon the sensitized strip P fed down from reel A over guide roller R before the opening or slit m on to another reel A'. The strip having been properly treated to bring out and fix the image thus obtained and render it suitable for use as a pattern, as before described, it is again wound upon reel A and its end hooked to reel A'. The apparatus EL is moved back far enough to take shutter s out of the beam of radiant rays which then pass through the negative and are varied thereby as they had been previously varied by the shutter s , after which they fall upon a selenium cell or other suitable apparatus p' , all as heretofore explained.

By suitably attaching the expansion wires of the telephone to the diaphragm d of the phonograph instead of to its own dia-

phragm d , the phonograph will make negatives of the sounds or signals transmitted to it over the line in connection with the telephone. This arrangement is shown in Fig. 13. The telephone is designated by EL, the base of which slides in the cleats $t\ t$ to the position shown by the dotted lines at its ends. $c\ c$ are the suspension wires running to the cross piece u which is attached to the diaphragm d which is carried by the base of the telephone and, consequently, moves with the binding posts at the other ends of the wires $c\ c$ when the diaphragm and shutter are to be moved back out of the way—thus avoiding any disarrangement of the telephonic adjustments thereby. T is the telephone telegraphic instrument or other apparatus which transmits sounds, electrical impulses, or signals from a distance to the telephonic devices EL by means of which those influences are enabled to actuate the phonograph and produce records or "patterns" thereof as already described. The same apparatus EL, can, of course, be employed for transmitting messages, etc., as well as for receiving them. The phonograph can, therefore, remain in the office and the speech, music, or signals be transmitted to it by telephone for record and preservation. In this form as in others, light from l passes across the shutter s when that shutter is in the position shown in full lines and falls on the sensitized strip P. When the shutter s is moved back out of the way and a developed strip is substituted for the sensitized strip P, the light passes through it to the selenium cell p in circuit with the primary of a transformer D. The telephone T' and any other suitable sound reproducer EL' are in circuit with the secondary.

In Fig. 14, the invention is shown with the parts arranged to reinforce the reproduced sound at various distances from the main apparatus. In this instance, the light l is within a casing having a semi-cylindrical end in which are formed the slits m, m' and m^2 . The record strip P passes over the rollers R and across the slits m, m' and m^2 , whereby the light from l passes through the slits to the selenium cells p placed opposite them. The telephone or sound reproducer T is in circuit with the selenium cell at slit m . The current from the second cell at slit m' passes through the primary wire of an induction coil I, the secondary of which sends an induced current through the several sound reproducing devices 1, 2 and 3 arranged in the arc of a circle with the main apparatus as the center, the characters s and 6 indicating the circuit connections whereby the single current passes through each of the reproducers. A second set of reproducing devices 1, 2, 3 and 4 are shown arranged on the arc of a circle x', x' , at a greater dis-

tance from the apparatus, the circuit connections being shown at s and 7. These series of reproducers on lines x , x and x' , x' , are for the purpose of reinforcing in a large hall, the sound coming from the reproducer T, the distance between the slits m , m' , and m^2 , and the speed of movement of strip P being so regulated that the sound from T will have traveled through the air to the line x , x , at the moment that the corresponding portion of the strip P reaches slit m' so as to operate the reproducers on the line x , x , at the same moment that the sound traveling through the air reaches that point.

In Fig. 19, the light from l after being varied by the shutter s carried by the diaphragm d passes through the slit m , and is converged by the lens p and then falls upon the negative P. Instead of falling on the negative P, a speaking diaphragm D may be substituted for it and the light will then fall on the diaphragm.

Fig. 22 is a horizontal section through the lines $x-x$ of Fig. 21, showing the light and lenses l , alum cell 2, shutter s , cylindrical lens p which converges the light laterally to a long narrow streak where it passes through the opening m to strip P. The set-screws t' t' adjust the forward position of the block t^2 on apparatus E l to bring the shutter s to the right point. p^2 is a small selenium cell which serves to automatically start off the strip P when the phenomenon occurs which is to be recorded. The shutter s is caused to vibrate, as already stated, and thereby uncovers the cell p^2 , allowing the light which had previously been stopped by the shutter to fall upon the cell and by increasing its conductivity an electric impulse is sent through the starting magnet M'. This immediately pulls up the armature and lever L and raises the pawl which had previously held the reel A', whereupon the reel is suddenly revolved and draws the strip P past opening m until the sound or other phenomena ceases, when the shutter becomes still, the current substantially ceases to flow through the cell p^2 and magnet M', the lever L drops and the reel A' is stopped. When reproducing the recorded phenomena the lever L is lifted manually by a cord a running over a pulley through an aperture to the outside at some accessible point, where it can be pulled when desired. The current of the cell p^2 can also be sent through induction coil I and transmit the message if desired to a telephone T at the same time that it is being recorded on P.

The shutter may be attached to the center of the diaphragm, or at the end of a light lever, as in Fig. 21, pivoted in a bar or support b . The diaphragm being connected to the short arm of the lever a greatly increased motion of the shutter is obtained.

Instead of a shutter cutting off transverse

light rays, we may use a plane mirror attached to the center of the diaphragm, and place the light in front but a little to one side, as shown in Fig. 12; the light beam will be reflected to the other side of the center. Now when the diaphragm vibrates the spot of light will also change its position, and the amplitude of its vibrations will be greatly increased by the angle between the light and the central line or axis of the mirror. A uniform pencil of light being thus vibrated on the sensitive surface will produce a sinuous record line as shown in Fig. 6. It will be observed that the sinuous record line produced by the vibrations of the spot of light whether by means of the mirror or of the shutter shown in Fig. 5 will be of uniform character at all points and will not vary in width or breadth but will merely vary in lateral position.

In Fig. 12, the parts marked O and O' are mouthpieces through which vocal or other sounds are thrown on the diaphragm d .

The messages sent by the apparatus described can be received by a telephone and spoken, printed, embossed, repeated, sent on or otherwise disposed of.

It will be observed that according to the present invention the speaking diaphragm is not called upon to do the physical work of actually making the record on the receiving body or surface. The record is made by a transmitted medium and the diaphragm merely controls the point of incidence. In other words, a pencil of light is projected on the record surface and the diaphragm has nothing to do save to vibrate it in accordance with sound waves.

It will be understood that the invention is not confined to the particular structural features shown and that it is adapted for various uses.

Having thus described the invention what is claimed is:

1. In a device for producing sound records, the combination with a speaking diaphragm, of a photo-sensitive surface, means for moving said surface, means including a shutter for cutting off light from said surface except through a single light opening, and means operated by said diaphragm for vibrating said shutter and said light opening in accordance with sound waves.

2. In a device for making sound records the combination with a photo-sensitive surface, of means for moving said surface, means including a movable shutter so constructed as to permit a single spot of light to reach said surface, and means for vibrating said shutter in accordance with sound pulsations whereby said spot will vibrate on said surface.

3. In a device for making sound records the combination with a photo-sensitive surface, of means for moving said surface,

means including a movable shutter having a light opening therein for permitting a single spot of light to reach said surface, and means for vibrating said shutter and
5 spot transversely of the line of motion of said surface by and in accordance with sound pulsations.

4. Means for recording sound waves comprising a movable sensitized surface, means
10 for moving said surface, an inclosure therefor provided with an opening, a shutter provided with a light opening and located in front of the opening in said inclosure, a receiving diaphragm, and devices intermediate of said diaphragm and shutter whereby
15 the latter is operated in accordance with the vibrations of the diaphragm.

5. Means for recording sound waves com-

prising a movable sensitized surface, means
for moving said surface, an inclosure there- 20
for provided with an elongated light opening for admitting light to said surface, a shutter extending across said opening and
provided with an elongated light opening
extending across said first-mentioned open- 25
ing, and means for moving said shutter longitudinally of said first-mentioned opening in accordance with sound pulsations.

In testimony whereof I affix my signature in presence of two witnesses.

JOSEPHINE H. FRITTS,
Administratrix of the estate of Charles Edgar Fritts, deceased.

Witnesses:

GEORGE L. GIBBS,
FRANCES E. FRITTS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

MEANS FOR PRODUCING, CONTROLLING, and
UTILIZING ELECTRIC CURRENTS,
#1,213,616-----C.E.Fritts, Dec'd.,
Patented-January 23rd, 1917.
Filed-June 22nd, 1912.

C. E. FRITTS, DEC'D.

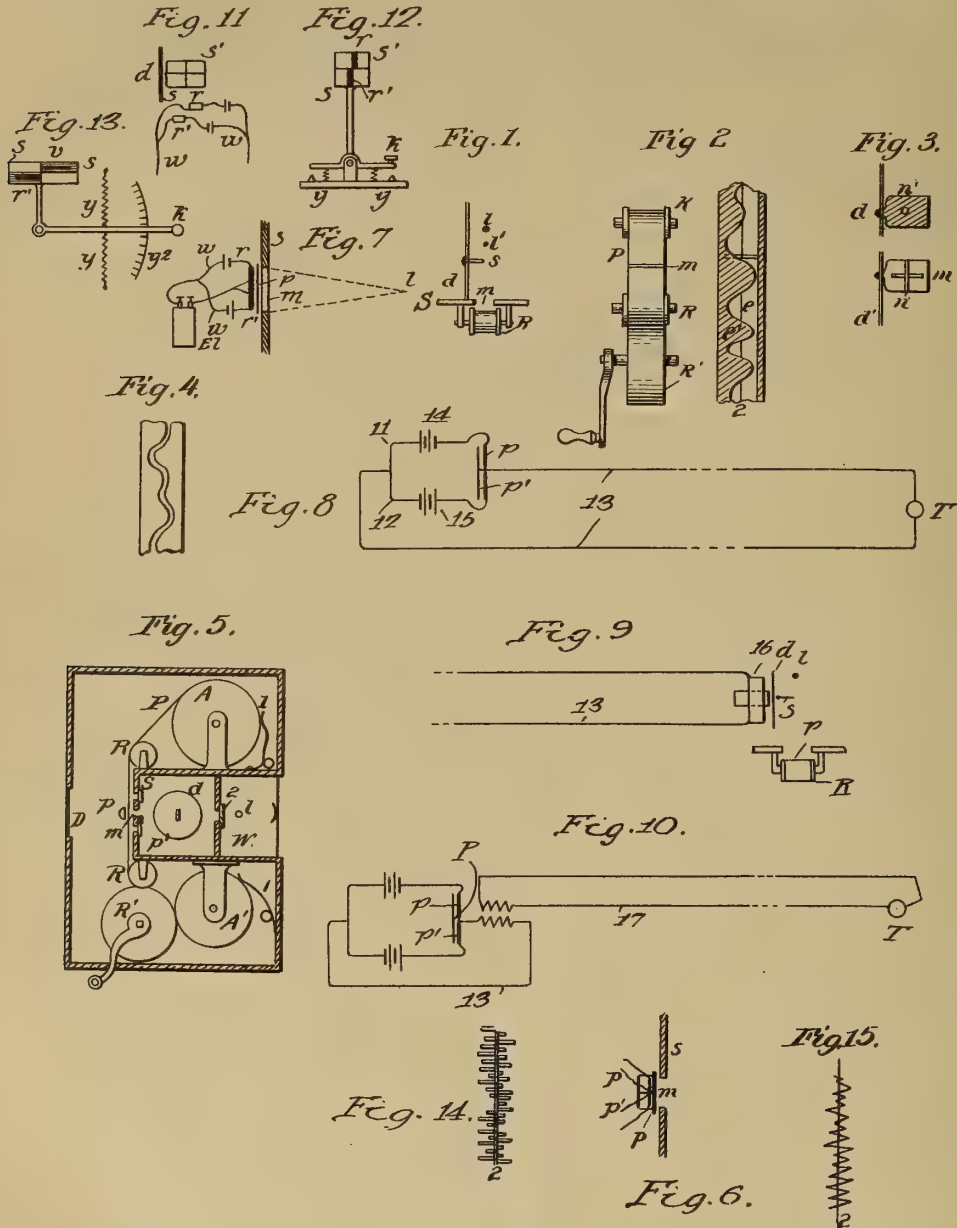
J. H. FRITTS, ADMINISTRATRIX.

MEANS FOR PRODUCING, CONTROLLING, AND UTILIZING ELECTRIC CURRENTS.

APPLICATION FILED JUNE 22, 1912.

1,213,616.

Patented Jan. 23, 1917.



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MEANS FOR PRODUCING, CONTROLLING, AND UTILIZING ELECTRIC CURRENTS.

1,213,616.

Specification of Letters Patent.

Patented Jan. 23, 1917.

Original application filed October 22, 1880, Serial No. 19,313. Divided and this application filed June 22, 1912. Serial No. 705,351.

To all whom it may concern:

Be it known that CHARLES EDGAR FRITTS, now deceased, but formerly a citizen of the United States residing at Oneonta, in the county of Otsego and State of New York, did invent a new and useful Improvement in Means for Producing, Controlling, and Utilizing Electric Currents, of which the following is a specification.

This invention relates to recording variations or pulsations in sounds, light, or electrical currents, in a permanent or tangible form, and reproducing the same at will, not merely at the instrument alone, but also at any other instrument suitably connected therewith,—and not merely in their original forms, but also changed as may be desired.

It consists in the application of photography and electricity for recording and reproducing such variations or pulsations, by the aid of a diaphragm or equivalent device capable of vibrating under those influences, and particularly under the influence of sounds, as hereinafter fully set forth. I have therefore termed it a photo-phono-graphic method and apparatus.

In a co-pending application Serial No. 19,313, filed October 22, 1880, of which this application is a division, I have fully shown and described means for recording, reproducing, transmitting and utilizing various pulsations and variations in sound, electricity, magnetism, etc.

In the present application I have shown so much of the apparatus as is necessary for a complete understanding of the invention herein claimed, reference being made to said co-pending application for further details.

My present invention relates particularly to the production and utilization of alternating currents produced by variation in resistance of two parts of a circuit, these parts being preferably branches of the same circuit. I make use of a pattern or record for controlling the direction and character of the current flowing in the circuit, and thus it is possible to get any desired wave form and to vary it as desired.

The novel features of the invention will

be apparent from the following description taken in connection with the accompanying drawings.

In the drawings: Figure 1 is a view partly broken away showing a speaking diaphragm carrying a shutter, a source of light and a roller carrying a sensitive strip exposed to said light through an opening controlled by said shutter. Fig. 2 shows at the left a plan view of the sensitive strip and rollers and at right an enlarged plan view of a portion of the strip having the photographic record thereon. Fig. 3 shows two forms of shutter mounted on diaphragms which may be used in carrying out my invention. Fig. 4 is a plan view of a strip having thereon a sinusoidal record produced by the shutter shown in Fig. 3. Fig. 5 is a vertical sectional view of one form of apparatus arranged for making the negative or pattern and moving it along by hand in carrying out my invention. Fig. 6 shows two selenium cells arranged for exposure through a single opening to produce alternating current. Fig. 7 is similar to Fig. 6 showing the electrical connections more clearly. Fig. 8 is a diagrammatic view of a circuit and translating device connected directly to the two variable resistances. Fig. 9 is a diagrammatic view of a translating device adapted to make a record of the pulsations in the circuit. Fig. 10 is a view similar to Fig. 9, a circuit receiving induced current from the controlling current having the variable resistances. Fig. 11 is a view of a divided shutter and two selenium bars for producing alternating current. Fig. 12 shows a modified form of divided shutter mounted as a key. Fig. 13 is a view of another arrangement. Fig. 14 shows a record view made by using one of the divided form of shutter. Fig. 15 shows a record such as will be produced by the upper shutter shown in Fig. 3.

In carrying out the present invention an electric circuit is provided with means therein which react to light, such as a selenium bar or cell so that under the influence of varying light the current flowing in said circuit will be varied. The current thus va-

ried may be conducted by wire to any instrument or place and there converted into sounds or utilized for any other purpose. The light reaching the selenium cell may be controlled by a pattern or record having recorded thereon variations in light, and as explained in original application 19,313 that pattern may be formed in various ways to represent various phenomena, such as sound waves, or it may consist of arbitrary predetermined signals. It is preferably made photographically and is so arranged and moved as to vary the light reaching the selenium cell in accordance with the forms on it. It may be in the shape of a negative strip passing across a slit or opening in a casing, the selenium being exposed to the light passing through it and through said slit. When the light is entirely cut off from the selenium, its resistance is so great that the current is (or may be) wholly prevented from passing through it. Thus the pattern can produce intermittent or undulating currents corresponding to the curves or forms upon it. In order to produce alternating currents, I arrange the selenium in two parts or sections, each section adapted to send whatever current penetrates it through the circuit in a positive direction. As the pattern allows one section to be exposed and lighted up, a current will be sent through the circuit in one direction, and vice versa; and in either case the strength of the current will be governed by the amount of light transmitted by the pattern. Any desired variations can thus be produced in electrical currents by using a suitable pattern. These currents can be utilized on the spot, or can be sent through the circuit to a distance, and, if desired, can be there repeated and sent on in a manner well known to electricians, and finally utilized in a telephone or electrical receiver of any kind.

It will be seen by reference to Fig. 6 that two selenium bars p and p' are placed behind a narrow slit m long enough to cover the length of the two bars and each bar is inclosed and protected from all light except that which passes through the slit. A record or negative strip P is fed past the slit m transversely, thus varying the light which reaches the bars in accordance with the forms on it. Each bar has proper wires to conduct the current through it, which are so connected up that each bar directs the current which flows in it through the line in an opposite direction, and their resistances are such that no current (or a very slight one) flows through either of them as long as they are kept in the dark. But immediately that the negative strip admits light to either bar, its resistance is lessened, and the current flows through that bar to the line, or to the primary coil of an inductorium which sends the induced current to line, or

to any other device, as the case may be,—the strength of the current being in proportion to the length of the bar thereby exposed to the light. The electrical connections are as more fully shown in Fig. 7, or they may be arranged in any other suitable or well known manner. The longer the transparent part of the strip or signal, the more of the bar is lighted up, and the stronger the current which flows through it. When the other bar is illuminated, the same effect is produced, but the current is sent through the line or circuit in the opposite direction,—all of which will be readily comprehended and effected by electricians.

The arrangement above described may be used with proper patterns or negatives for producing alternating currents or undulating currents of alternately opposite polarity. The two cells are arranged end to end with their approximating ends at the central line of the pattern strip so that one cell or bar is opposite one half of the slit m and the other bar or cell opposite the other half. Each cell is arranged to send whatever current flows through it in a direction opposite to that of the current from the other cell, in any well-known or suitable manner and each may be supplied with its current from different ends or sections of the same battery or from separate batteries, as shown in Figs. 6 and 7 where the two sections of the selenium are inserted in derived circuits or branches of the main circuit ww . In either case, the electric current is arranged to flow through the selenium by proper conducting wires and the varying quantity of light which falls upon the selenium will correspondingly vary the current flowing through it, as is well known to electricians.

In Fig. 7 P represents the pattern or strip moving past the slit m in the partitions S and r and r' represent the two sections of the slit with the sectional current-controlling device arranged behind it—each section when lighted sending a current of opposite polarity through the circuit E' represents any suitable translating device for utilizing the current transmitted and l represents a source of light.

In Fig. 8 the two selenium bars p p' are shown in the branch circuits 11 and 12 of the main circuit 13 and batteries or other sources of electricity 14 and 15 are placed in the branch circuits so connected as to tend to send current in opposite directions. A translating device T is placed in the main circuit.

Fig. 9 shows a translating device for utilizing the current variations in the main circuit 13 consisting of an electro-magnet 16 operating to vibrate a diaphragm d carrying a shutter s which controls the passage of light from a source l to a photo-sensitive strip P carried by the rollers R .

In Fig. 10 the circuit 13 controlled by the selenium bars p p' induces current in a second circuit 17 which has in it a translating device T.

Mechanism which may be used in producing the negatives or patterns used to control the light passing to the two selenium bars is shown in Figs. 1, 2, 3, 5, 12 and 13 and some of the records produced are shown in Figs. 4, 14 and 15. The mechanism will be first described with reference to the production of sound records or negatives.

In making the negatives, the sound to be recorded is caused to impinge upon a vibrating diaphragm, which is properly damped and arranged, as will be readily understood by those versed in telephony. To the center of the diaphragm d , Fig. 1, is fixed a vertical screen or shutter s of mica or other light and stiff material being attached by its center and the outer corners rounded off a little to prevent their contact with the diaphragm during its backward vibrations, or to the left. It projects out at right angles to the plane of the diaphragm and is made opaque to prevent the passage of any light through it. Fig. 1 is a vertical plan view; s is the shutter, d the diaphragm, l is a powerful light throwing a beam of nearly parallel rays across the screen or partition S , which has a long narrow slit m in it, through which the light passes and strikes the prepared surface, which in this case is represented as a strip of sensitized paper, fed at a regular speed over the rollers R R . As the diaphragm shutter s normally stands its edge shuts the light off from one half of the slit and in vibrating it covers up more or less of the strip according to the extent of the vibrations. The paper strip being carried along behind the slit m , Fig. 2, the edge of the shutter will describe a curved line at the junction of the part e' ; not acted upon by the light, and e , which is acted upon; and by proper treatment the latter may be dissolved away or otherwise made transparent in any well known way, as will be at once understood by photographers.

If, instead of an opaque shutter on the diaphragm, there is left a vertical transparent strip across said shutter, the light will reach the paper strip behind the screen only through the intersection of the two slits in front of it, forming merely a square spot of light, as shown by Fig. 3 at the intersection of the two slits n and m . The vertical slit on the mica should make the light beam of about the same width as the stationary horizontal slit in the screen. As the diaphragm vibrates and the paper is moved along, we produce (after dissolving out the parts exposed to light, blacking the rest, soaking in oil or otherwise rendering it transparent) a narrow, transparent curve

on the paper strip, as represented in Fig. 4. Instead of the vertical strip, we may use a transparent spot at the point which will fall on the center of the stationary slit when the diaphragm is still, as seen at n on the upper shutter shown in Fig. 3. This also makes a negative strip, like Fig. 4.

Fig. 5 illustrates an apparatus which may be used in making the negative or record strip, and in the particular form shown the light reaching the strip is controlled by sound pulsations. It will be understood, however, that a similar structural arrangement may be used in making records by manual control of the light. At A is a roll of the prepared negative strip wound upon a bobbin which is mounted in journal bearings in any convenient way. This strip may be of any suitable thin and flexible material which may be strong fine paper, but what is known as paper parchment is preferred, although many other substances may be used. It should be covered with a thin film made very sensitive to light by any of the instantaneous processes employed in photography, although a dry process will be most convenient with this form of negative. After being properly coated and sensitized, it should be carefully dried, rolled up, and protected from light or damp until ready to use it. It may be thus coated and sensitized either before or after being cut up into strips of width suitable for use, but in the latter case, care must be taken in the cutting not to disturb the adhesion of the film to the strip. A suitable width is $\frac{1}{2}$ or $\frac{3}{4}$ inch and the length will, of course, be governed by convenience or the choice of the operator.

The roll A is free to turn, being held only by the spring 1 pressing upon it sufficiently to prevent it from turning faster than the strip is needed. From A the strip passes over the flanged rollers R R , Figs. 1, 2 and 5; at R' is a rubber-faced roller which presses the paper strip between itself and R tightly enough to prevent the slipping of the strip. It also fits between the flanges of the roller enough to carry that along with it. If desired, it can also press lightly on the roller A' to assist in rewinding the strip upon it. To this roller can be applied the power which feeds the strip along before the slit m in the screen or partition S . For experiment or common telegraphic purposes a crank may be attached to the roller R' or R , as shown in Fig. 5, or the strip may be otherwise fed by hand. But when accuracy is required, some motor should be employed which will give the negative a perfectly uniform and known rate of speed. These are not new and need not be described, as they form no part of my invention. The motor may be attached to or contained in the box or frame of the phonograph or

otherwise connected as preferred. The strip being thus fed along at a uniform speed it is wound upon a second roller A' or may simply be fed loosely into the bottom of the box or case of the phonograph after exposure to the varying light. It will now remain unchanged if kept from light and damp, for days or even weeks, or, on the other hand, it may be at once developed, intensified, fixed, or otherwise treated to render the image permanent,—according to the process employed or the effect desired. All of which will be at once understood by those versed in photography, who will be enabled from the foregoing description to readily make a negative strip having the characteristics required and will probably prefer the gelatino-bromid process. If the paper seems to have a greasy nature, it may, before applying bromid emulsion, be coated with four per cent. solution of white of egg to which sufficient chrome-alum has been added to give it a slight bluish tinge. This will insure the film adhering perfectly. But it will seldom be required if a good quality of paper or parchment is used. These strips being fixed, they may be treated and used in different ways. The parts acted upon by light may be made transparent and the rest blacked and rendered more opaque and the strip used by transmitting light through it; or the strip may be left opaque and used by reflected light—in which case the parts acted upon by light should be made as white or brilliant, and those not acted upon as black and absorbent of light as possible, all of which can be done by any one out of many well known ways, and detailed directions are not necessary. For example, a strip to be used by transmitted light may have the dark parts blacked with carbon-ink, flexible black varnish, or otherwise, and the lights rendered transparent by dipping in castor oil thinned with absolute alcohol.

The finished strip being again wound upon the wheel or roller A and properly arranged in the phonograph, we can reproduce the original variations in the first beam of light in another beam of light, by feeding the strip before the slit *m* at the same speed as when making the negative and throwing the beam of light through it as it passes the slit. To do this, the diaphragm *d* with its shutter is removed—the upright frame which holds it being arranged to slide on a foot-piece which fits in grooves so that it may be slid into its place for use, or moved back out of the way, as desired. The square chamber which contained the diaphragm is now empty or free and allows the light *l* to shine unobstructed across it to and through the slit *m* onto and through the strip which is rapidly fed before it, whereby the light which passes through the strip is

varied in precisely the same manner as the original beam of light was varied by the shutter on the diaphragm *d*, *i. e.*, the greater the proportion of the strip which is transparent, the longer the beam of light which is passed through it, and vice versa (see Fig. 2). This light can now be used to produce corresponding variations or pulsations in sound, electric currents, magnetic attractions, etc., as desired.

By arranging the diaphragm *d* or its shutter *s* to be operated manually, feeding the strip slowly and vibrating the shutter in a manner similar to that used in sending Morse signals the result would be a strip with transparent lines across it. The shutter can, of course, be actually arranged on a sort of key and be vibrated manually before the slit *m* to intercept the light properly. Fig. 11 shows this device adapted for producing alternating currents. The parts *s* and *s'* are opaque, the rest of the shutter transparent. The black bodies *r* and *r'* represent the two sections of the slit *m* which are normally covered or protected by the opaque portions *s* and *s'*. But when the key K is operated to move the shutter to the right it uncovers the section *r*, and vice versa, thus producing the pattern precisely as already described, only it is now done manually instead of automatically. By arranging the shutter like Figs. 3 and 13, to be moved in both directions from the center and to different distances for the different letters or signals, a strip like Fig. 14 would be made. Fig. 13 shows the key or lever K for moving the shutter, the proper distances being indicated by the scale *y*². The springs *y y* keep it normally in its central position and when moved to either side it uncovers one of the sections of the slit *m* precisely as described for Fig. 12 and the further the key is turned on its central pivot the more of the slits or openings are uncovered by the shutter and the greater the length of the beam of light allowed to pass through to the sensitive surfaces behind the slit. Or the pattern strip could be punched out or otherwise produced by hand in the manner now practised for automatic telegraphing. Such a strip prepared in either way can then be run through the instrument at almost unlimited speed and the signals will be perfectly produced by the light being varied during its passage through the strip and then falling on two selenium bars or strips or other current-controlling devices arranged behind the slit *m*, producing correspondingly varying currents, which are then sent over the line or other currents induced by them sent instead to another phonograph or to one of my telephones or other apparatus, as shown at E₂ in Fig. 7, where P is the pattern or strip moving past the slit *m* in the partitions, S, and *r* and *r'* represent the two sections of

the slit with the sectional current-controlling device arranged behind it—each section, when lighted, sending a current of opposite polarity through the circuit.

5 A pattern like that shown in Fig. 4 and also one like that shown in Fig. 15 can be made by the use of a shutter like that shown in Fig. 3 where a single spot of light passes to the negative and is vibrated laterally as the strip moves.

10 A strip or pattern like that shown in Fig. 14 will produce an alternating current whose changes of strength and polarity will be sudden or instantaneous for each section of the cell will be at once lighted for the whole length of the signal or form on the strip then as suddenly shut off from all light, and the other cell or section will be lighted and operated by the form on the opposite half of the pattern strip. A pattern like Figs. 2, 4 and 15, however, produces the changes of strength and polarity gradually. When designed to be used with a divisional selenium cell, they should, of course, be made by a divisional shutter on the diaphragm, as shown in Fig. 12. In using such a shutter to produce negatives, it should be arranged so that the central vertical line or division of the shutter will fall on the central line of the slit m , which should also be made preferably in two parts in different planes, as shown by the position of r and r' in Figs. 12 or 13. When arranged as in Fig. 12, the opaque part s of the shutter stands between the light and the part r' of the slit and s' covers up the slit r , as will be understood from Fig. 13, where the parts are so arranged. Now, when the shutter vibrates to the right, s' uncovers more or less of slit r , and when moving to the left, the part r' of the slit is similarly exposed by the removal of s . The sensitive surface being fed down past the slit, a pattern is produced like Fig. 2 but with the two halves independent, and possibly, dissimilar,—each corresponding to the movements of its own half of the shutter. By now moving this pattern (when finished) past the slit again after arranging a sectional selenium cell behind it with each section of the selenium behind the corresponding section of the cell (and the shutter being now moved back out of the way) we shall produce alternating currents whose variations in strength and polarity will correspond to the original vibrations of the shutter and, therefore, of the force which moved it—the principle involved in making and using the pattern being precisely the same as already described.

60 Having thus described the invention what is claimed is:

1. The combination with two sources of electricity and a circuit connected thereto, branch conductors in said circuit, each having one of said sources oppositely connected

therein, and a conductor the resistance of which is affected by light included in each branch circuit.

2. The combination with two sources of electricity and a circuit connected thereto, 70 branch conductors in said circuit, each having one of said sources oppositely connected therein, each branch conductor including a selenium cell.

3. The combination with a source of electricity and a circuit connected thereto, two 75 branch conductors in said circuit each including an oppositely connected section of said source of electricity and a conductor the resistance of which is affected by light, and a translating device affected by the relative currents flowing in said branch conductors. 80

4. The combination with a source of electricity and a circuit connected thereto, of 85 branch conductors in said circuit each including an oppositely connected section of said source of electricity and a selenium section, said selenium sections being adjacently mounted, and means for supplying variable light to said selenium sections. 90

5. The combination with sources of electricity and a circuit associated therewith, of branch circuits connecting opposite poles of said sources of electricity to one terminal of said circuit, a selenium conductor in each branch circuit, and means for supplying varying light to said selenium conductors. 95

6. The combination with sources of electricity and a circuit associated therewith, of 100 branch circuits connecting opposite poles of said sources of electricity to one terminal of said circuit, a selenium conductor in each branch circuit, and means for supplying varying light to said selenium conductors increasing and diminishing alternately and reciprocally to impress upon said circuit an alternating current. 105

7. The combination with sources of electricity and a circuit associated therewith, of 110 branch circuits connecting opposite poles of said sources of electricity to one terminal of said circuit, a conductor the resistance of which is affected by light in each branch circuit, a source of light, and a movable record constructed to control and vary the rays from said light supplied to said conductors to vary the amount and direction of current impressed upon said circuit. 115

8. The combination with a source of electricity and a circuit associated therewith, of 120 branch circuits connecting opposite poles of said source of electricity to one terminal of said circuit, adjacently located selenium conductors in said branch circuits, a source of light, and a movable record translucent in degrees to control the degree and alternation of light admission to said selenium conductors. 125

9. The combination with a source of elec- 130

tricity and a circuit associated therewith, of
branch circuits connecting opposite poles of
said source of electricity to one terminal of
said circuit, adjacently located selenium con-
5 ductors in said branch circuits, a source of
light, and a record translucent in degrees
upon successive portions and movable before
said selenium conductors to vary and cut off
the light with respect to each selenium con-
10 ductor alternately.

10. The combination with an electric cir-
cuit, of two selenium cells adjacent to each
other and each connected with said circuit
and a source of electricity arranged to direct
15 current in said circuit in opposite directions,

means for excluding light from said cells
except on one face, an elongated flexible rec-
ord strip having successive portions trans-
lucent in degrees and movable across said
face with part overlapping each cell, and 20
means for passing light through said strip
to said cells modified by said record strip.

In testimony whereof I affix my signature
in presence of two witnesses.

JOSEPHINE H. FRITTS,
*Administratrix of the estate of Charles Ed-
gar Fritts, deceased.*

Witnesses:

GEORGE L. GIBBS,
FRANCES E. FRITTS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

SYNCHRONOUS PHONOGRAPH AND
KINETOGRAPH,

#1,213,883-----I. Kitsee,
Patented-January 30th, 1917.
Filed-July 1st, 1912.

1,213,883.

I. KITSEE.
SYNCHRONOUS PHONOGRAPH AND KINETOGRAPH.
APPLICATION FILED JULY 1, 1912.

Patented Jan. 30, 1917.

5 SHEETS—SHEET 1.

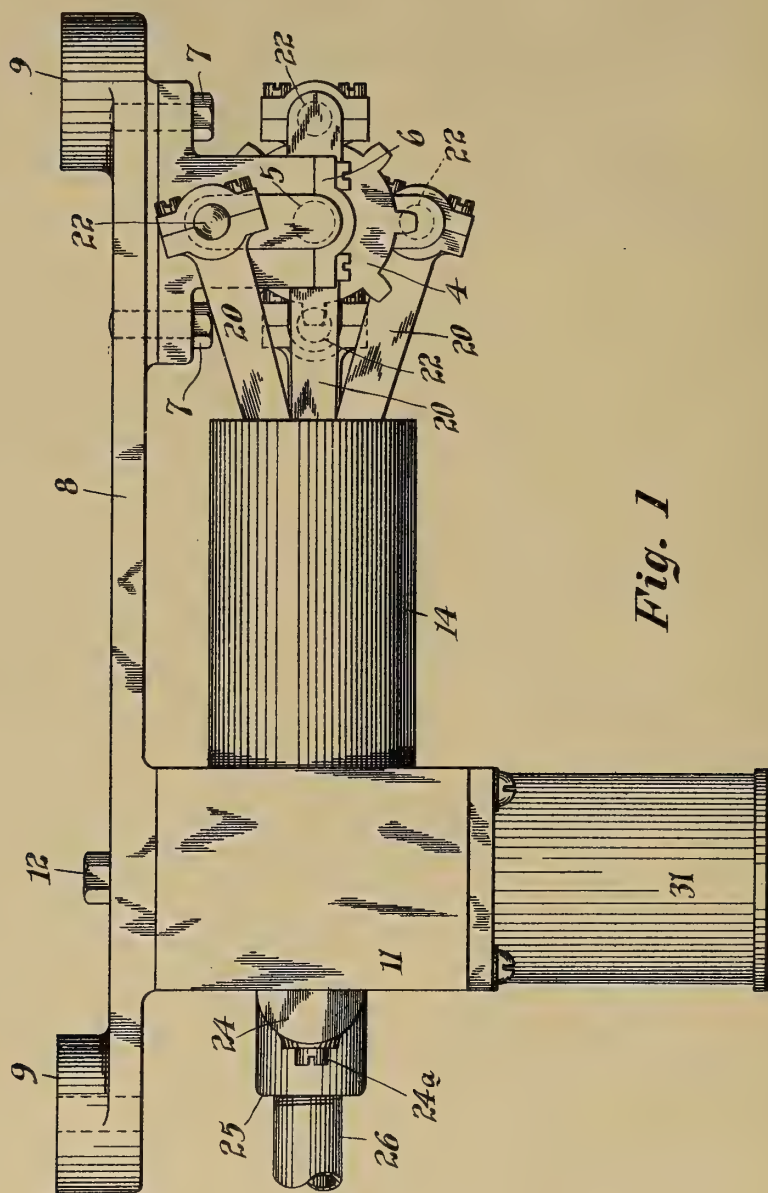


Fig. 1

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 5 SHEETS—SHEET 2.

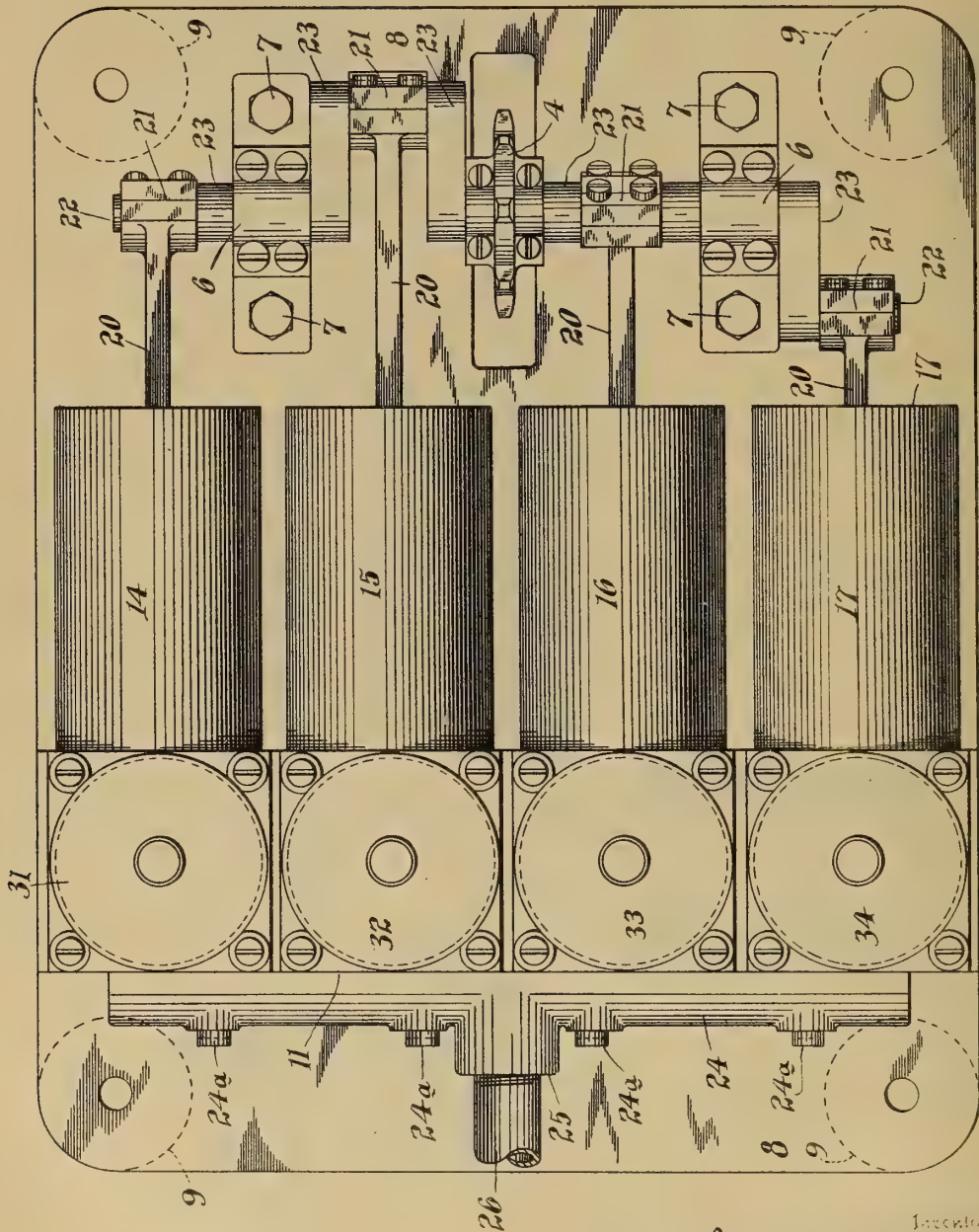


Fig. 2

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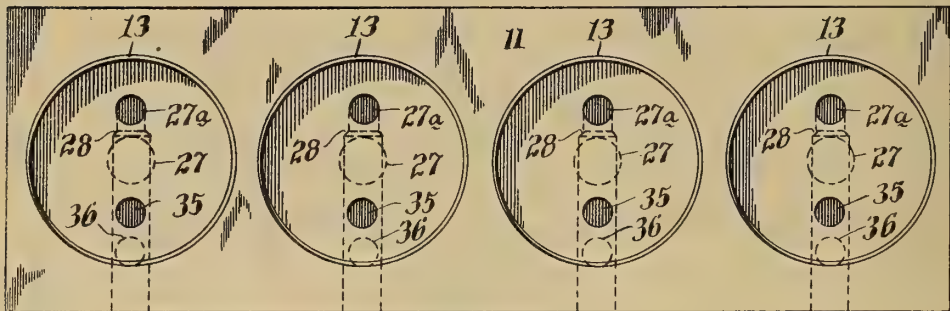
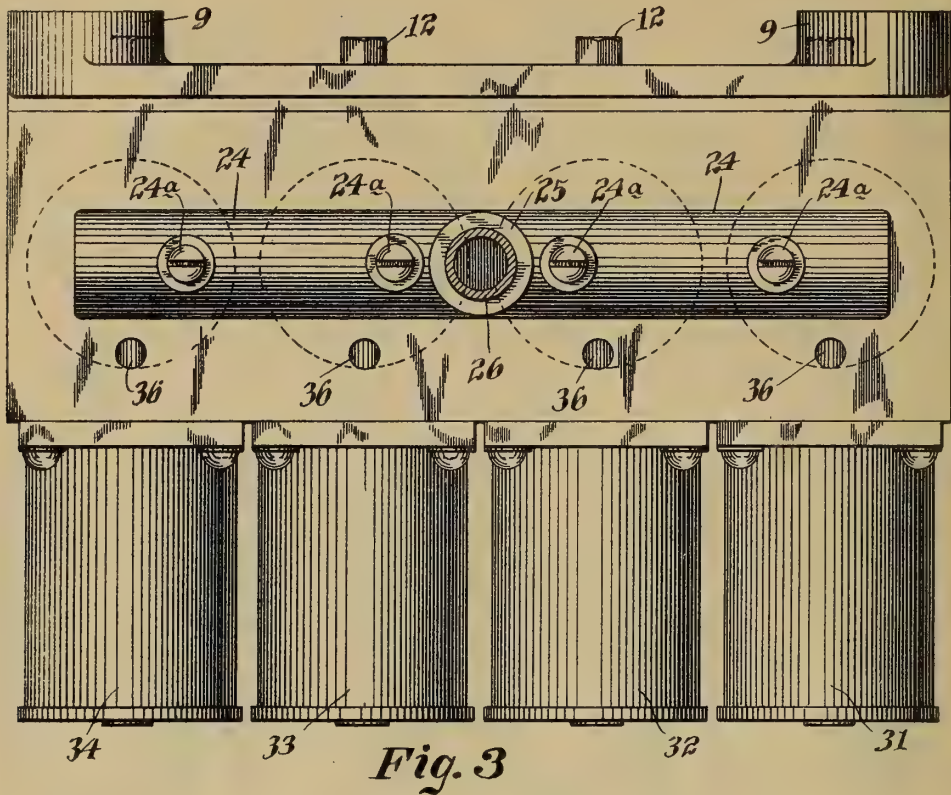
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5 SHEETS—SHEET 3.



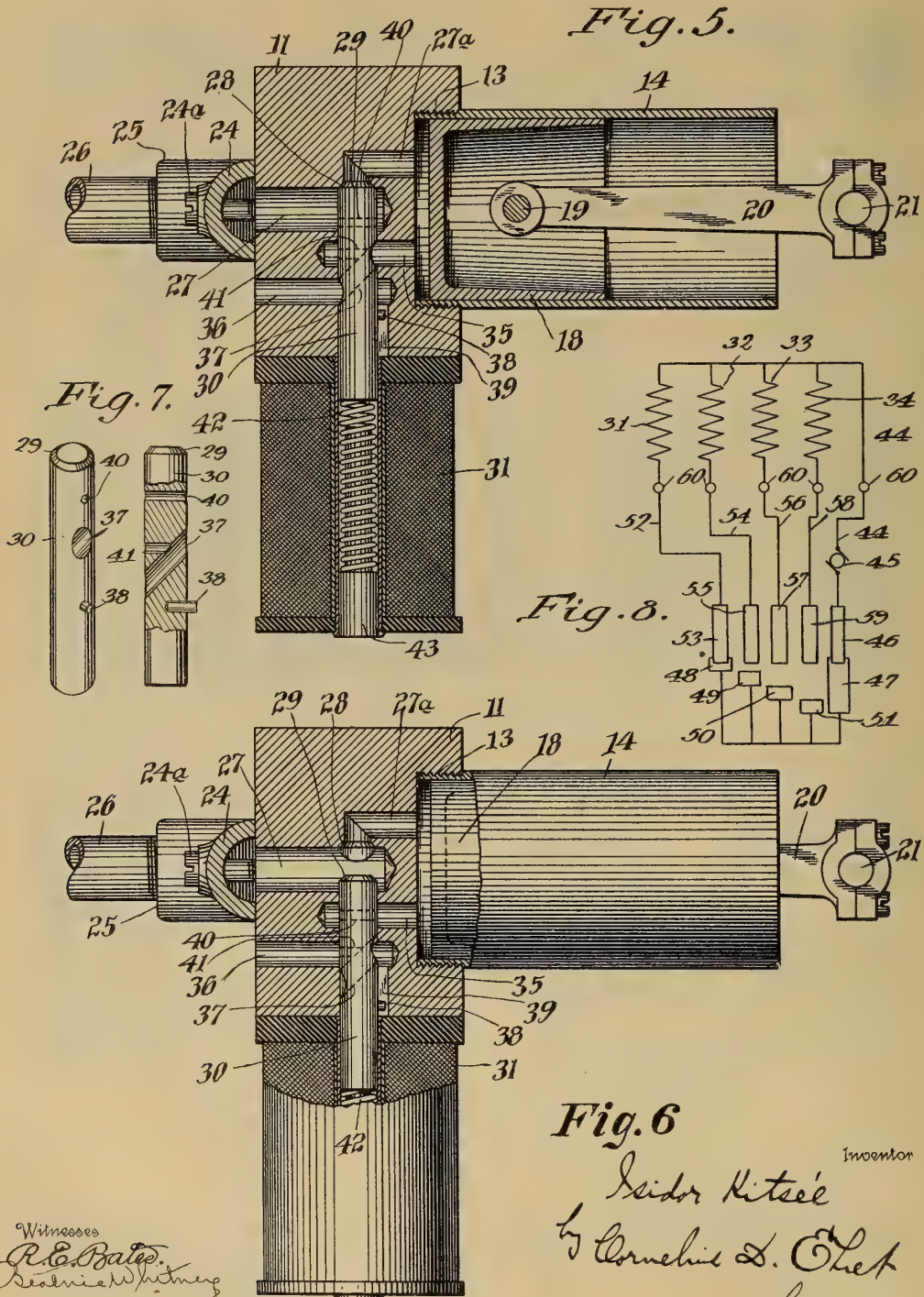
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1,213,883.

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5 SHEETS—SHEET 5.

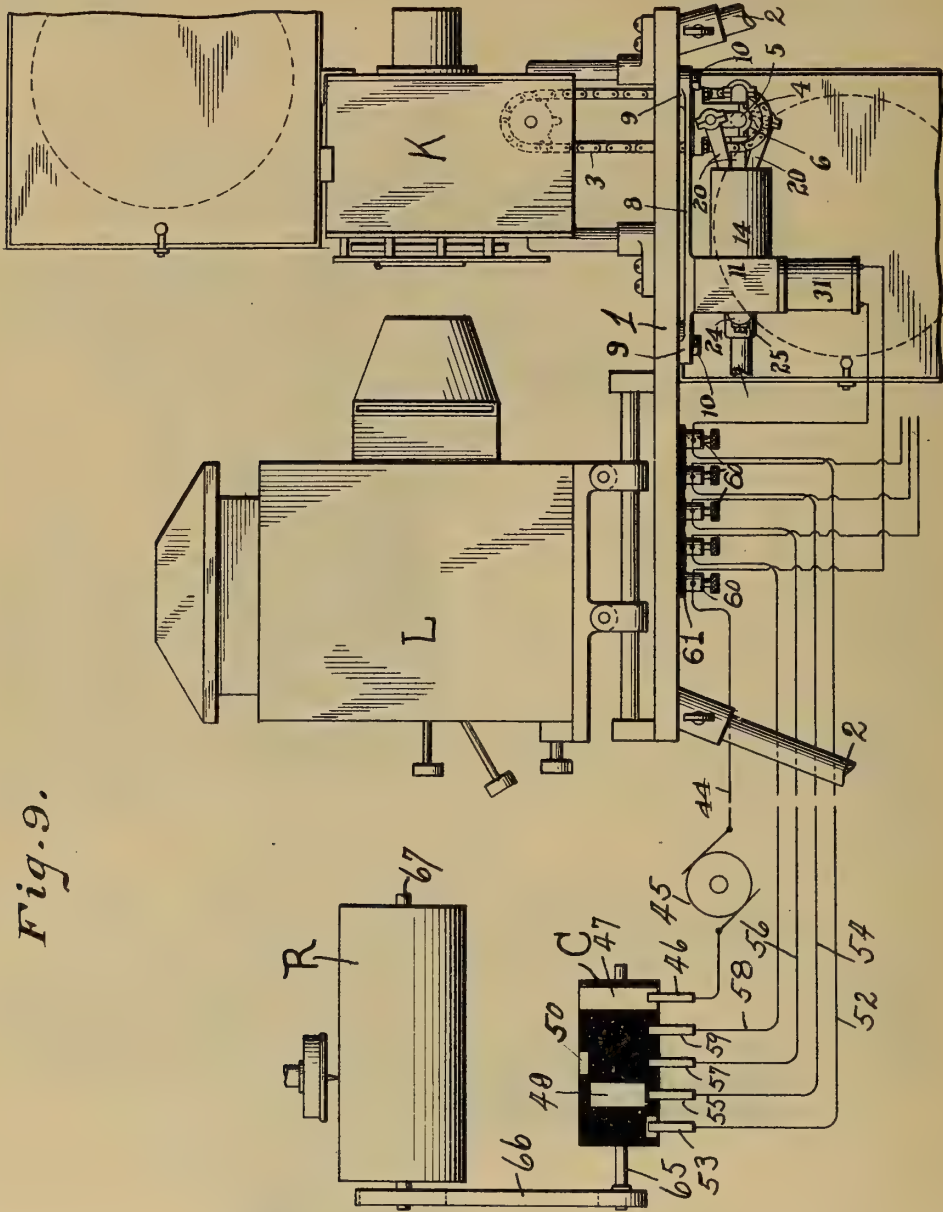


Fig. 9.

WITNESSES

Daniel Webster, Jr.
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BY

Isidor Kitsee
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 his ATTORNEY

UNITED STATES PATENT OFFICE.

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SYNCHRONOUS PHONOGRAPH AND KINETOGRAPH.

1,213,883.

Specification of Letters Patent.

Patented Jan. 30, 1917.

Application filed July 1, 1912. Serial No. 706,887.

To all whom it may concern:

Be it known that I, ISIDOR KITSEE, a citizen of the United States, residing in the city of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Synchronous Phonograph and Kinetograph, of which the following is a specification.

My invention relates to synchronous phonograph and kinetograph mechanisms, that is, moving picture mechanism and phonograph mechanism operating in synchronism or step with each other so that the movements of pictures or objects in the moving pictures shall be accompanied with exactness by the reproduction of sounds which originate with the same movements of objects or figures.

My invention resides in synchronous phonograph and kinetograph mechanisms in which a pneumatic controlling or motive device is employed for controlling or driving, by preference, the kinetograph mechanism, such control or motive device being controlled by the other of the mechanisms, by preference, the phonograph.

The pneumatic control or motive device is characterized by construction affording substantially dead points beyond which a motive fluid, preferably air, cannot actuate the individual part with which it coöperates, so that the control device or motive device as a whole cannot run ahead of or lag behind the other mechanism, as the phonograph.

In one of the forms my invention may take, a plurality of reciprocating pneumatic engines are employed, the admission of the power fluid or air to the different cylinders being controlled by electro-magnetically actuated valves, the electro-magnetic actuating means being in turn controlled by a commutator driven or movable in definite relation with a sound record of a phonograph.

For an illustration of one of the forms my invention may take reference is to be had to the accompanying drawings, in which:

Figure 1 is a side elevational view of the pneumatic control or motive device. Fig. 2 is a bottom plan view of the same. Fig. 3 is a rear elevational view of the same. Fig. 4 is a front view of the support for the cylinders. Fig. 5 is a sectional view through a cylinder valve and valve magnet, show-

ing the valve in the closed position. Fig. 6 is a sectional view, similar to Fig. 5, showing the valve in the open position. Fig. 7 comprises a perspective view and a longitudinal sectional view, partly in elevation, of the movable member of the valve. Fig. 8 is a diagrammatic view illustrating the one form the electrical control circuits may take. Fig. 9 is an assembly view, partially diagrammatic, showing the kinetograph control led by the phonograph.

Referring first to Fig. 9, 1 is a table or support, provided with legs 2, upon which is supported the kinematograph mechanism, comprising kinetograph K and lantern L, as illustrated, for example, in my application Serial No. 696,995, filed May 13, 1912. A sprocket chain or other driving means 3 extends through the table 1 and drives the kinetograph mechanism, as for example, in said prior application. The sprocket chain 3 passes over the sprocket wheel 4 secured upon the crank shaft 5 having the bearings 6 held by bolts 7 to the bed plate 8 of the control or motive device, the bed plate 8 having the lugs 9 secured to the table 1 by bolts 10. The support 11 for the cylinders of the control or motive device is secured to the bed plate 1 by the bolts 12. The cylinder support 11 has a screw threaded opening 13 for each cylinder of the control or motive device. Four cylinders 14, 15, 16 and 17 are screw threaded into these openings 13, the member 11 forming the heads of all the cylinders. Each cylinder is provided with a piston 18 to which there is pivoted at 19 a connecting rod 20 having at its other end a bearing 21 embracing a crank pin 22, there being a crank 23 on the shaft 5 for each crank pin. The crank pins are set, in the example illustrated, at 90° with respect to each other.

Secured air tight to the rear of the cylinder support 11 by screws 24^a is a manifold 24 receiving at 25 the pipe 26 leading to a source or reservoir of air pressure or to a source or reservoir of any other suitable gas or motive fluid, as for example carbon-dioxid or the like compressed in a tank. For each cylinder there is a port or passage 27 communicating with the manifold 24. Associated with the port 27 is a cylinder port 27^a and a valve seat 28 against which is adapted to be seated the valve 29 attached to or forming part of the iron core or armature

30 of a solenoid or electro-magnet whose winding is 31, secured to the under side of the cylinder support 11, as illustrated in Fig. 5. For each of the other cylinders there is provided a similar valve mechanism and solenoid, the other solenoids being indicated at 32, 33 and 34.

Communicating with the interior of each cylinder is a port 35, and associated with each exhaust port 35 is a second exhaust port 36 communicating with the outer atmosphere. In the core 30 is a diagonally disposed passage 37 which brings the ports 35 and 36 into communication with each other when the valve is seated as shown in Fig. 5. To prevent rotation of the core 30, there is secured thereto a pin 38 movable in the vertical slot 39 in the member 11. The core 30 is provided with passages 40 and 41, the former extending entirely through the member 30, and the latter communicating with the passage 37. These passages are provided to allow the motive fluid or gas to surround the stem 30, to prevent excess of pressure thereon in any direction, thereby making the valve what is known as a balanced valve. The core or stem 30 is normally held up so that the valve 29 is seated against the seat 28 by the spring 42. Inasmuch as the stroke or movement of the member 30 need not be great, each solenoid is provided with the stationary magnetizable core 43, upon which the spring 42 rests, the part 43 extending, with smaller diameter toward the core 30, the spring 42 surrounding this part of reduced diameter.

Referring now to Fig. 8, the four solenoid windings are indicated at 31, 32, 33 and 34. Each has a terminal connected to the conductor 44 connecting to one terminal of a source of current 45 whose other terminal is connected with commutator brush 46 bearing upon the circumferentially continuous commutator ring or contact 47 with which the commutator contacts 48, 49, 50 and 51 are permanently in electrical communication. The contacts 48, 49, 50 and 51 are spaced around the commutator so that only one of them is in circuit at a time. The other terminal of winding 31 connects through conductor 52 with brush 53 adapted to engage commutator contact 48; the other terminal of winding 32 communicates through conductor 54 with brush 55 adapted to engage contact 49; the other terminal of winding 33 communicates through conductor 56 with brush 57 adapted to come into engagement with contact 50; and the remaining terminal of winding 34 communicates through conductor 58 with brush 59 adapted to engage contact 51.

Inasmuch as the phonograph and kinetograph are generally separated from each other a considerable distance, the conductors 52, 54, 56, and 58 and 44 extend from the

phonograph to the kinetograph, and may be disposed in a cable if desired.

The commutator is shown in Fig. 8 as developed, or rolled out into a plane for the sake of clearness. In actual construction however the contacts 47, 48, 49, 50 and 51 are disposed upon a suitable cylinder or support C of insulating material secured upon shaft 65 driven by or in definite relation with the sound record R of the phonograph, as by belt or chain 66 driven by shaft 67 of the phonograph.

The conductors 44, 52, 54, 56 and 58 lead to binding posts 60 which may be disposed, as indicated in Fig. 9, upon the table 1 by securing them to the insulating member 61 which is itself secured to the table 1.

The operation is as follows: When the sound record R is in motion, the commutator C moves in definite relation therewith. First, for example, solenoid winding 31 is energized by current flowing from source 45 through brush 46, contact 47, to contact 48, through brush 53, conductor 52, winding 31, to conductor 44. The solenoid 31 being now energized, it attracts its core 30 downwardly and removes valve 29 from seat 28, allowing pressure to be exerted behind the piston 18, the air behind the piston 18 during previous operation having been exhausted through port 35, passage 37, and port 36 to the outer atmosphere. Due to the exertion of air or other pressure back of piston 18, it moves toward the right, Fig. 5, driving connecting rod 20 and its associated crank, giving to the shaft 5 a partial rotation which is communicated to the kinetograph driving chain 3 through sprocket wheel 4. As contact 48 separates from brush 53, contact 49 comes into engagement with brush 55, causing energization of solenoid 32 whereupon the associated valve admits pressure back of the piston of cylinder 15 which gives a further impulse to the shaft 5. And upon deenergization of solenoid 31, spring 42 returns valve 29 to its seat, cutting off air supply to cylinder 14 and exhausting the air back of piston 18. And so on in succession the different solenoids are energized in succession with the resultant admission of pressure to and exhaustion from the different cylinders in succession, producing rotation of shaft 5, sprocket wheel 4 and movement of chain 3 to drive the kinetograph mechanism. In consequence the kinetograph mechanism is driven or controlled in synchronism with the sound record so that the proper movement of the figures or objects in the moving pictures accompanying the sounds originally produced in accompaniment with such movements. And from the character of the control or motive device it is apparent that it cannot run any faster than allowed by the commutator, and therefore by the sound

record, and that it cannot lag behind the commutator or sound record in its movement.

While I have illustrated electro-magnetically controlled valves, it is to be understood that the valves may be controlled by any other means controlled by the sound record; the valves may be controlled pneumatically by air or other medium under pressure controlled in turn by small pilot valves actuated in succession in definite relation with the movement of the sound record.

What I claim is:

1. The combination of a sound machine, a pneumatic engine and a picture machine adapted to be driven by said engine of electro-magnetic valve mechanism controlling said engine, said mechanism controlled by said sound machine.

2. The combination with a kinetograph and a sound producing machine, of pneumatic means driving said kinetograph, electro-magnetic valve mechanism controlling said pneumatic means, said valve mechanism controlled by said sound producing machine.

3. The combination with a kinetograph and a sound record, of pneumatic means driving one of them, valve mechanism controlling said pneumatic means, electro-magnetic means controlling said valve mechanism, and switching mechanism controlled by the other of them controlling said electro-magnetic means.

4. The combination with a kinetograph and sound record, of a plurality of pneumatic engines controlling the movement of one of them, valve mechanism controlling said engines, electro-magnetic means controlling said valve mechanism, and switching mechanism controlled by the other of them controlling said electro-magnetic means.

5. The combination with a kinetograph and sound record, of reciprocating pneumatic engines controlling the movement of one of them, valve mechanism controlling said engines, electro-magnetic means controlling said valve mechanism, and switching mechanism controlled by the other of them controlling said electro-magnetic means.

6. The combination with a kinetograph and sound record, of a plurality of reciprocating pneumatic engines controlling the movement of one of them, a valve for each

engine, electro-magnetic means controlling each valve, and a commutator moving in definite relation with the other of them controlling said electro-magnetic means.

7. The combination with a kinetograph and sound record, a plurality of reciprocating pneumatic engines controlling the movement of one of them, admission and exhaust valves for each of said engines, an electro-magnet controlling said admission and exhaust valves, and a commutator moving in definite relation with the other of them controlling said electro-magnets.

8. The combination with a kinetograph and sound record of means to synchronize the movements of both of them, said means comprising a pneumatic engine and electro-magnetic controlled valves for same and operated by said sound record.

9. The combination with a kinetograph and sound record, of a plurality of pneumatic engines controlling the movement of said kinetograph, each engine having dead centers, the dead centers of the different engines occurring at different times, a valve controlling each engine, and electro-magnetic means controlled by said sound record controlling said valves in succession.

10. The combination with a kinetograph and sound record, of a plurality of pneumatic engines controlling the movement of one of them, each engine having a dead center, the dead center of the different engines occurring at different times, a valve for each engine, an electro-magnet controlling each valve, and a commutator controlled by the other of them controlling said electro-magnets in succession.

11. The combination with a kinetograph and sound record, of a plurality of pneumatic pressure devices for moving said kinetograph, each pneumatic device capable of definitely limited movement only, electro-magnetic means controlling energization of each of said pneumatic devices, and a commutator moving in definite relation with said sound record controlling said electro-magnetic means in succession.

In testimony whereof I have hereunto affixed my signature in the presence of the two subscribing witnesses.

ISIDOR KITSEE.

Witnesses:

ELEANOR T. McCALL,
BEATRICE WHITNEY.

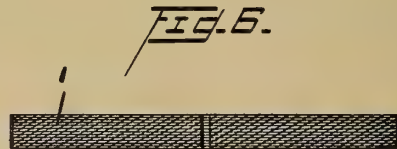
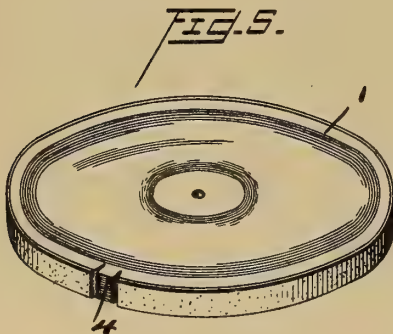
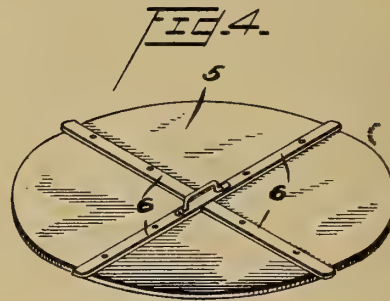
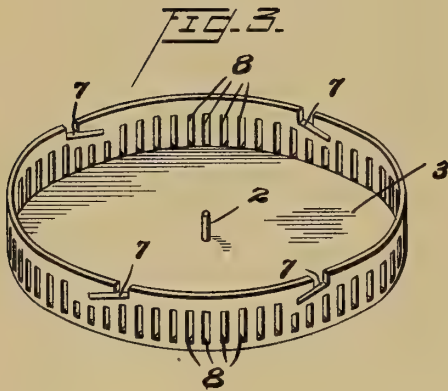
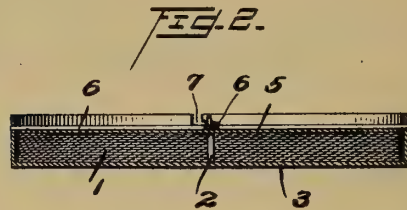
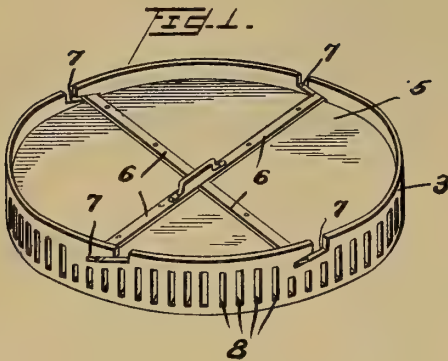
MULTIPLE DISK RECORD FOR
PHONOGRAPHS,

#1,213,990-----N.B.Wolcott,
Patented-January 30th, 1917.
Filed-January 31st, 1916.

N. B. WOLCOTT.
 MULTIPLE DISK RECORD FOR PHONOGRAPHS.
 APPLICATION FILED JAN. 31, 1916.

1,213,990.

Patented Jan. 30, 1917.



Witnesses

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CR. Deaman

Inventor

Neil B. Wolcott

By

Robert F. Young
 Attorney

UNITED STATES PATENT OFFICE.

NEIL B. WOLCOTT, OF WASHINGTON, DISTRICT OF COLUMBIA.

MULTIPLE-DISK RECORD FOR PHONOGRAPHS.

1,213,990.

Specification of Letters Patent. Patented Jan. 30, 1917.

Application filed January 31, 1916. Serial No. 75,359.

To all whom it may concern:

Be it known that I, NEIL B. WOLCOTT, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Multiple-Disk Records for Phonographs, of which the following is a specification.

My invention relates, in a broad sense, to multiple disk records for phonographs.

The object of my invention is to produce a disk record comprising a plurality of disk units upon each of which is recorded a part of a phonographic record, the units of which comprise a multiple of a complete record arranged in sequence upon the unitary disks, which collectively comprise a continuous and sequent production.

A further object of my invention is to produce a plurality of disks adapted to be assembled into a composite phonographic record and to be collectively placed upon the revolving table of a phonograph and successively render the records each of which comprises a unit or multiple of a related or sequent literary production.

A further object of my invention is to produce a multiple record comprising a plurality of disk units adapted to be assembled for sequent rendition and means for assembling such units and disassembling same for sequent production.

To these ends, my invention includes the combination and arrangement of component parts to be hereinafter described and more particularly pointed out in the claims.

In the accompanying drawings, in which like characters indicate similar parts: Figure 1 is a perspective view of my invention fully assembled; Fig. 2 is a vertical sectional view of the same. Fig. 3 is a perspective view of the container of my multiple record; Fig. 4 is a perspective view of the closure for said container. Fig. 5 is a perspective view of my multiple record assembled for use, and Fig. 6 is a vertical sectional view of the same.

In the preferred embodiment of my invention it comprises a plurality of disks formed of suitable material and properly coated for the reception and retention of a sound record adapted to be assembled into a magazine or tablet form 1, each of which units is provided with a central orifice to accommodate the hollow stud 2 centrally car-

ried on the receptacle 3, and each of the disks are provided with a radial tab 4 on its outer edge adapted to register with each other when assembled to facilitate their separation, as hereinafter described. Said disks are preferably compressed into tablet form and secured together about their edges by adhesive paste. After a portion, or what may be termed a chapter, of a serial literary or musical production has been recorded on each of the disks comprising the units of my composite and complete record, they are assembled and secured in sequent order, as shown in Fig. 5 of the drawings, in which condition they may be placed upon the revolving table of a phonograph and the record on the uppermost disk rendered in the ordinary way. Upon its completion the uppermost disk is readily removed by grasping the tab on its edge and laid face downward in the receptacle 3, when the next disk becomes exposed and may be successively produced, which may be continued until the last becomes exposed. The several disks may then be arranged in sequent order in the receptacle 3 with the tabs 4 registering and tightly compressed upon each other by the plate 5 having the radial bars 6, the outer ends of which engage the bayonet slots 7 in the wall of the receptacle. It is obvious that a turn of the plate will compress the disks together where they will be held and in which position their outer edges may again be sealed with paste through the vertical slots 8 in the walls of the receptacle. After the paste has sufficiently dried the disks may be removed from the receptacle and are again prepared for successive rendition on a phonograph.

Each of the disks, as assembled, are preferably formed of very thin material and are incapable of separate and independent use for rendition of the record thereon and are only capable of rendition when assembled and properly secured together in composite tablet form.

While I have disclosed a concrete embodiment of my invention, it will be appreciated that other means may be employed to produce a plurality of record disks arranged in composite form for successive and sequent rendition without departing from the spirit and scope of my invention within the terms and scope of the appended claims.

Having thus described my invention, what

I claim as new and desire to be secured by Letters Patent is:

1. A composite disk record for phonographs, comprising a plurality of disk units having sound records on each, said units being secured together and adapted to be collectively placed upon a revolving phonograph table and successively rendered on a sound reproducer.
2. A composite disk record for phonographs, comprising a plurality of disk units each of which has a sound record thereon comprising a part of a continuous record of which all of the units comprise the whole, said units being arranged in sequent order and secured together to be collectively placed upon a revolving phonograph table and successively rendered on a sound reproducer.
3. A composite disk for phonographs, comprising a plurality of disk units each of which has a sound record thereon, means for securing the same together in compos-

ite form, and means by which the uppermost unit may be successively removed.

4. A composite disk record for phonographs, comprising a plurality of disk units each of which has a portion of a continuous sound record thereon, said units being arranged in sequent order and glued together on their outer edges, an unsecured tab on the outer edge of each by which each may be grasped to be successively removed from the assembled group.

5. A composite disk record for phonographs, comprising a plurality of disk units each of which has a portion of a continuous record thereon, a container having peripheral openings for holding said units in compressed relation whereby they may be sealed together on their outer edges.

In testimony whereof I hereby affix my signature.

NEIL B. WOLCOTT.

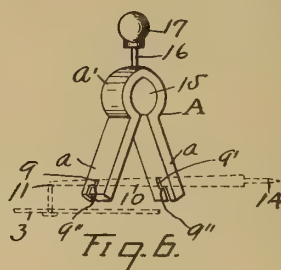
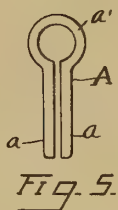
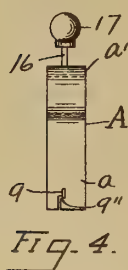
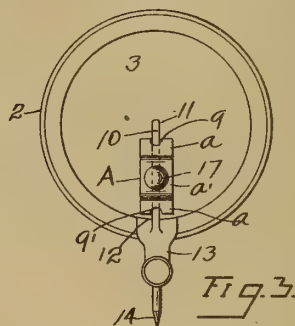
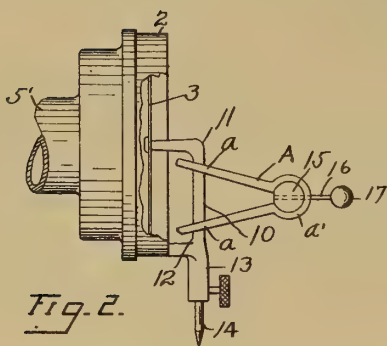
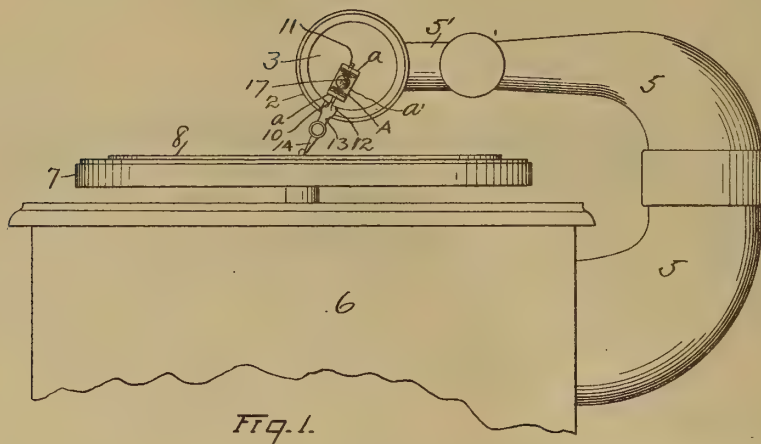
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

TONE-PURIFIER FOR TALKING-MACHINES,
#1,214,050-----Charles P. Marshall,
Patented-January 30th, 1917.
Filed-April 24th, 1916.

C. P. MARSHALL.
TONE PURIFIER FOR TALKING MACHINES.
APPLICATION FILED APR. 24, 1916.

1,214,050.

Patented Jan. 30, 1917.



WITNESS
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INVENTOR.
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ATTORNEY

UNITED STATES PATENT OFFICE.

CHARLES P. MARSHALL, OF WATERTOWN, NEW YORK.

TONE-PURIFIER FOR TALKING-MACHINES.

1,214,050.

Specification of Letters Patent. Patented Jan. 30, 1917.

Application filed April 24, 1916. Serial No. 93,038.

To all whom it may concern:

Be it known that I, CHARLES P. MARSHALL, a citizen of the United States, residing at Watertown, in the county of Jefferson and State of New York, have invented certain new and useful Improvements in Tone-Purifiers for Talking-Machines, of which the following is a specification.

This invention relates to means for purifying the tones of phonographs, talking machines, and like musical instruments, and the invention relates particularly to a tone modifier or purifier comprising a damping device for attachment to the vibration-bars which vibrate the reproducing diaphragms of such instruments.

The prime object of the invention is to improve the quality of the tones of the instruments and render them clearer, truer, purer, and more natural than heretofore.

The particular object of the invention is to improve the means shown and described in my pending application, Serial No. 22709, filed April 20, 1915.

I attain these objects by the means set forth in the detailed description which follows, and by reference to the accompanying drawing, in which—

Figure 1 is an elevational view of the reproducing parts of a talking machine; showing my tone purifier applied thereto. Fig. 2 is an enlarged side elevation, with parts broken away, of the transmitter; showing the tone purifier mounted on the vibration-bar. Fig. 3 is an open face view of the transmitter. Fig. 4 is an enlarged view of the damping part. Fig. 5 is a view of the damping part before it is applied to the vibration-bar. Fig. 6 is a perspective view of the damping part; showing the slots for receiving the vibration-bar.

In the drawing, 2 represents the hollow case of the reproducer or transmitter of a talking machine, in which is disposed the diaphragm 3. The reproducer is mounted upon the usual hollow sound-arm 5—5', which is supported by the box or cabinet 6.

7 represents the revolving support for the record disk 8, which is mounted on the top of the cabinet in the usual manner.

My tone modifier or purifier relates particularly to an attachment to be applied to the reproducers of talking machines of various kinds, or may also be applied to the recording parts of such instruments, and

comprises a member or part A, for subduing the discordant "noise" of the fundamental note of the vibration-bar, as well as the diaphragm. The noises referred to, it may be explained, are not parts of the music transmitted from the record, but are harsh, grating notes or sounds which are given off by the vibration-bar and diaphragm, when these parts are vibrated by the contact of the needle with the revolving record disk.

The member A consists of a piece of rubber or other suitable material, preferably soft and flexible, like the material of an eraser or rubber band, which is preferably forked, as shown in Figs. 2, 5 and 6. The free ends of the legs *a* are slotted, as at 9 and 9', to receive or straddle the vibration-bar 10, or preferably that portion of said bar which extends between the elbow 11 and a shoulder 12 of the support 13 which holds the needle 14. Fig. 5 shows the forked part A before it is spread and applied to the vibration-bar.

When making the member A ready for applying to the bar 10, a block or part 15 is inserted in the looped or closed end *a'* of the said member, for spreading the legs *a*. The loop *a'* constitutes a spring, the tension of which holds the block or spreader 15 in place. Under certain conditions, the loop *a'* and the block 15 are pierced by a slender rod 16, which extends beyond the loop and its outer end supports a ball or weight 17, which may be solid or hollow according to the amount of weight required. The member A is held upon the vibration-bar by means of the zigzag slots 9—9', which are preferably reversed, or formed right and left. By arranging the slots 9—9' as illustrated in Figs. 4 and 6, the shoulders 9'' prevent the member A from becoming accidentally disengaged from the bar 10. By the use of the zigzag slots, the damping part A may be readily and quickly applied to, or removed from the bar 10, and it is not necessary to employ any other securing means therefor.

The rubber member A may be made to different forms, and may be applied to the vibration-bar in various ways, and may or may not have associated with it the pins and balls 16 and 17.

By disposing the member A upon the vibration-bar, the said part being comprised of soft rubber or like substance, tends to

damp or lessen the amplitude of the vibrations of said bar, and also subdues any vibratory "noise" which may be produced by the said bar. The length of the member A, as well as the spacing of its legs, and also the contact of the legs with the different portions of the vibration-bar, all tend to restrict the vibrations, and also to subdue "noises" of said bar to a greater or less extent, and in practice the operator may readily and quickly shift the rider A from one position to another, for altering or effecting the different degrees of modification referred to. The ball 17 and its supporting rod 16 both contribute to the subduing effect of the member A upon the vibration-bar, and their presence or absence can be noticed by a quick ear. The member A does not in any way hinder the bar 10 from performing its intended work, *i. e.* transmitting the vibrations from the needle 14 to the diaphragm 3. The member A, owing to its size, weight and non-vibrative nature, restricts the amplitude of the vibrations of the said bar, and in this way prevents, or to a great extent weakens the "noise" referred to. By steadying and governing the vibration-bar, as hereinbefore described, owing to the direct or positive connection between the vibration-bar and the diaphragm, and the near proximity of the member A to the said diaphragm, much of the "noise" or harsh sounds from the fundamental notes of the diaphragm are overcome or subdued, and a pleasing tone quality is noticeable in the reproductions of the records. The leg *a* nearest the elbow 11 of the bar 10, tends to reduce or restrict the lateral vibrations which are greatest at the elbow, while the leg *a* nearest the rim of the transmitter case tends to steady or damp the opposite end of the bar. By disposing the member A, as shown in the drawing, the bar 10 is divided into two or more sections or portions, neither of which is capable of vibrating to a dangerous extent, owing to the near proximity and frequency of the damping parts *a*. By increasing the bulk or weight of the member A, as well as, the size or weight of the ball 17, the lateral vibrations of the bar 10 become less and less. And since it is the lateral vibrations of the bar 10 that chiefly excite the fundamental notes of the bar and related parts, the lessening of these vibrations prevents the buckling of the diaphragm and the consequent raw or harsh "noises" of both the vibration-bar and diaphragm, which render the reproductions of the records unfaithful and impure.

In my former application referred to, the damping part "A" was not adjustable lengthwise on the vibration-bar, and hence was incapable of controlling or subduing the lateral vibrations of that portion of the bar between the elbow and the rim of the casing. The forked member of the present applica-

tion is adjustable lengthwise on the bar, and may be disposed in many different positions relatively to the elbow and the rim of the casing, and the legs *a* may also be adjusted relatively to each other for varying the extent of the damping or stabilizing of the vibration-bar.

By constructing and arranging the member A, as herein shown and described, the tone of the instrument is purified by reducing the amplitude—especially of the lateral vibrations of the bar 10. The member A being forked and its legs spread apart, so as to engage spaced portions of the bar 10, when taken with the length or height of the said member, its weight and its peculiar grasp of the bar, tends to steady the said bar and to cause it to vibrate truer, *i. e.* eliminate the greater part of the lateral vibrations, but leaves the said bar free to vibrate toward and away from the diaphragm. By thus damping the vibration bar, the diaphragm as well as said bar produce less "noise," consequently the true musical tone as recorded is reproduced. By adding the ball 17 to the member A, still more of the lateral vibrations of the bar 10 are eliminated, which further improves the tone of the reproduction.

Having thus described my invention, what I claim as new and desire to secure by Letters Patents, is—

1. The combination of the reproducer of a talking machine, having a diaphragm and a vibration-bar, and a damping device comprising a forked elastic part having its legs slotted to receive spaced portions of the said bar.

2. The combination of a talking machine having a vibration-bar and a reproducing diaphragm, and a tone modifier comprising a forked elastic part, the legs of the said part having zigzag slots to receive and to interlock with the said bar.

3. The combination with a talking machine having a sound reproducing mechanism including a vibration-bar and a diaphragm actuated by said bar, of a forked damping device adjustably mounted upon the vibration-bar, the legs of said device spread apart for damping spaced portions of the said bar, and having zigzag slots to receive and interlock with the said bar.

4. A tone purifier for talking machines, comprising a non-conductor of sounds mounted upon the vibration-bar which vibrates the diaphragm, the said non-conductor of sounds being bifurcated and its legs having slots to receive and grasp spaced portions of said bar.

5. A tone purifier for talking machines, comprising a non-conductor of sounds mounted upon the vibration bar which vibrates the diaphragm, the said non-conductor of sounds being bifurcated and its legs

having slots to receive spaced portions of said bar, and a weight carried by said non-conductor of sounds for steadying the same.

6. A tone rectifier for talking machines
 5 comprising a forked elastic part adjustably mounted upon the vibration-bar which actuates the diaphragm, the said part having the free ends of its legs slotted to receive and grasp said bar.
- 10 7. The combination of the reproducer of a talking machine having a diaphragm and a vibration bar, the said bar having an elbow adjacent the center of the diaphragm, a damping device slidably mounted on the
 15 vibration bar between said elbow and the margin of the diaphragm, and a ball carried by said damping device for steadying the same.

8. A tone modifier for talking machines,
 20 comprising a forked damping member adjustably supported by the vibration bar which vibrates the diaphragm, the legs of

the said member spread apart and having slots to receive and interlock the said bar.

9. A tone purifier for talking machines, 25 comprising a forked adhesive member, the free ends of the legs of said member being slotted for engaging spaced portions of the vibration bar which actuates the reproducing diaphragm, the said member capable of
 30 being moved lengthwise on the said bar for varying the lateral vibrations of the bar.

10. A tone purifier for talking machines, comprising a forked adhesive member, the
 35 free ends of the legs of said member being slotted for engaging spaced portions of the vibration bar which actuates the reproducing diaphragm, the said member capable of being moved lengthwise on the said bar, and
 40 a ball mounted on the opposite end of the said member for restricting the vibratory movements of the said bar.

In testimony whereof I affix my signature.

CHARLES P. MARSHALL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

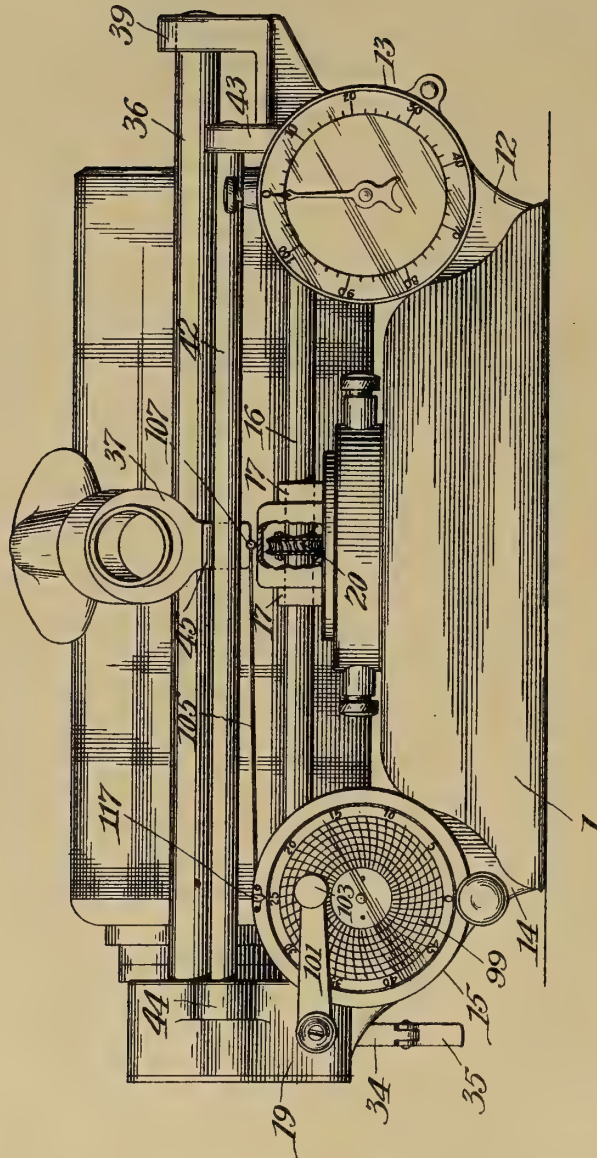
TALKING-MACHINE,
#1,214,106-----Clinton E. Woods,
Patented-January 30th, 1917.
Filed-January 24th, 1914.

C. E. WOODS.
TALKING MACHINE.
APPLICATION FILED JAN. 24, 1914.

1,214,106.

Patented Jan. 30, 1917.
7 SHEETS—SHEET 1.

Fig. 1.



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TALKING MACHINE.
APPLICATION FILED JAN. 24, 1914.

1,214,106.

Patented Jan. 30, 1917.
7 SHEETS—SHEET 2.

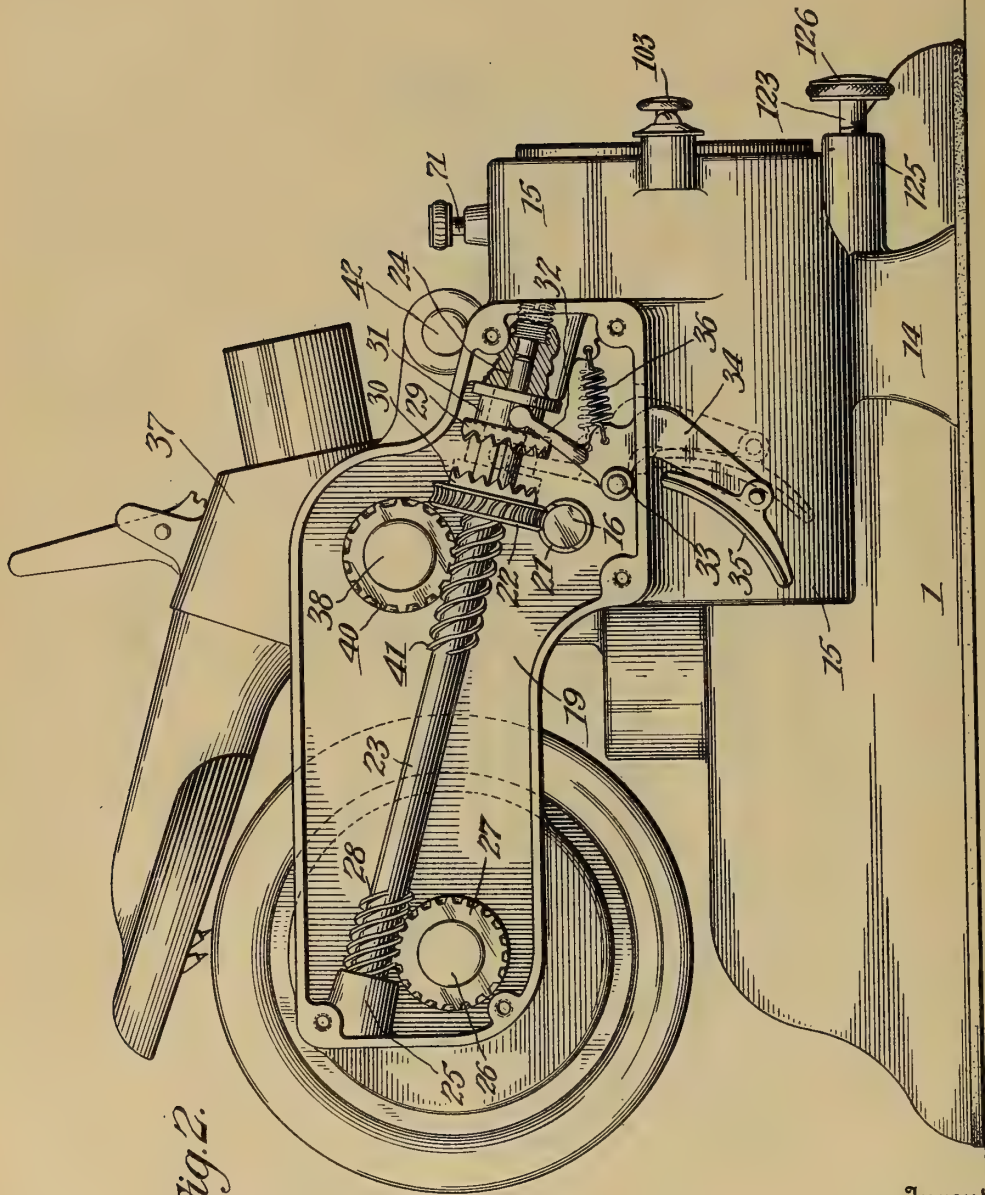


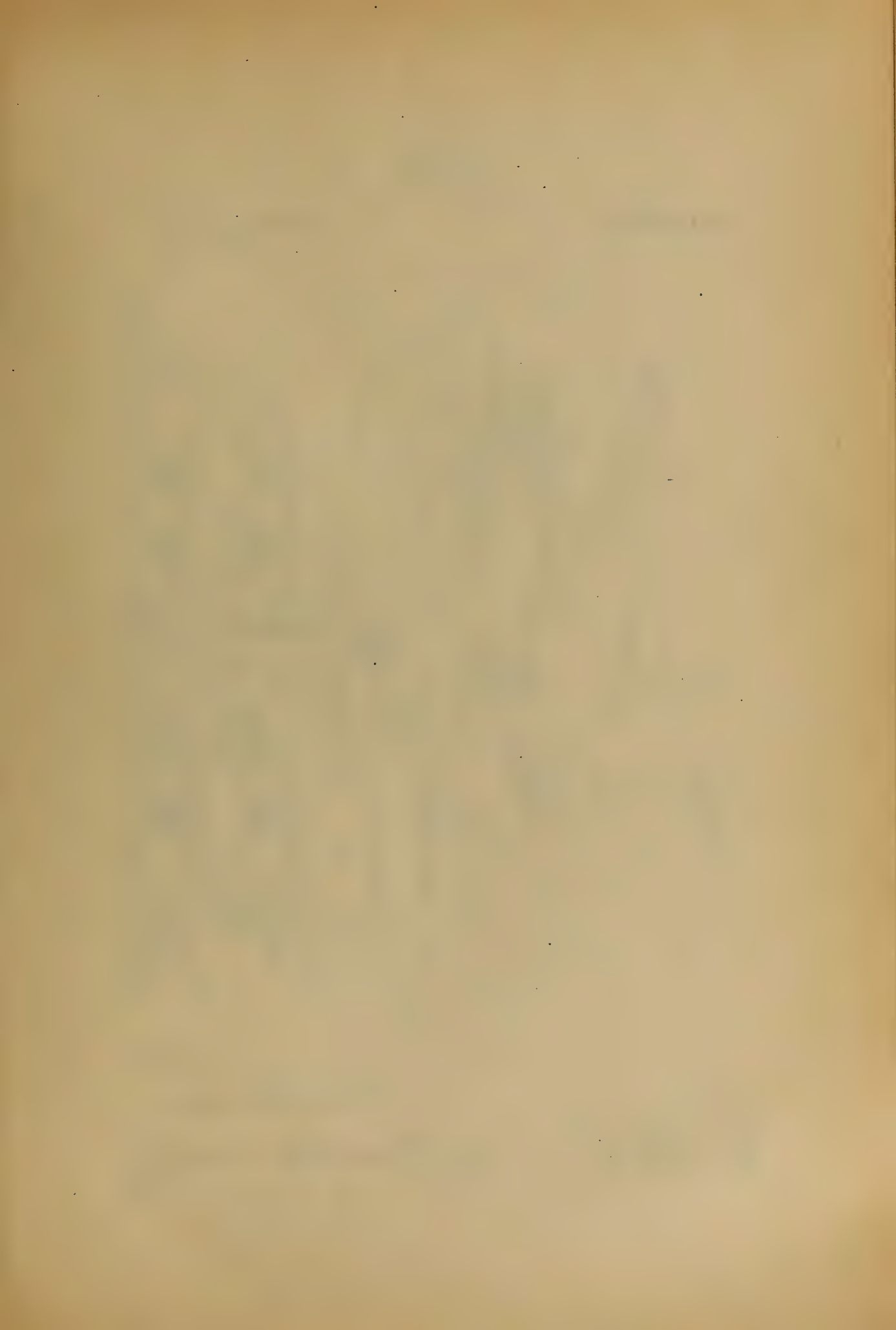
Fig. 2.

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C. E. WOODS.
TALKING MACHINE.
APPLICATION FILED JAN. 24, 1914.

1,214,106.

Patented Jan. 30, 1917.
7 SHEETS—SHEET 3.

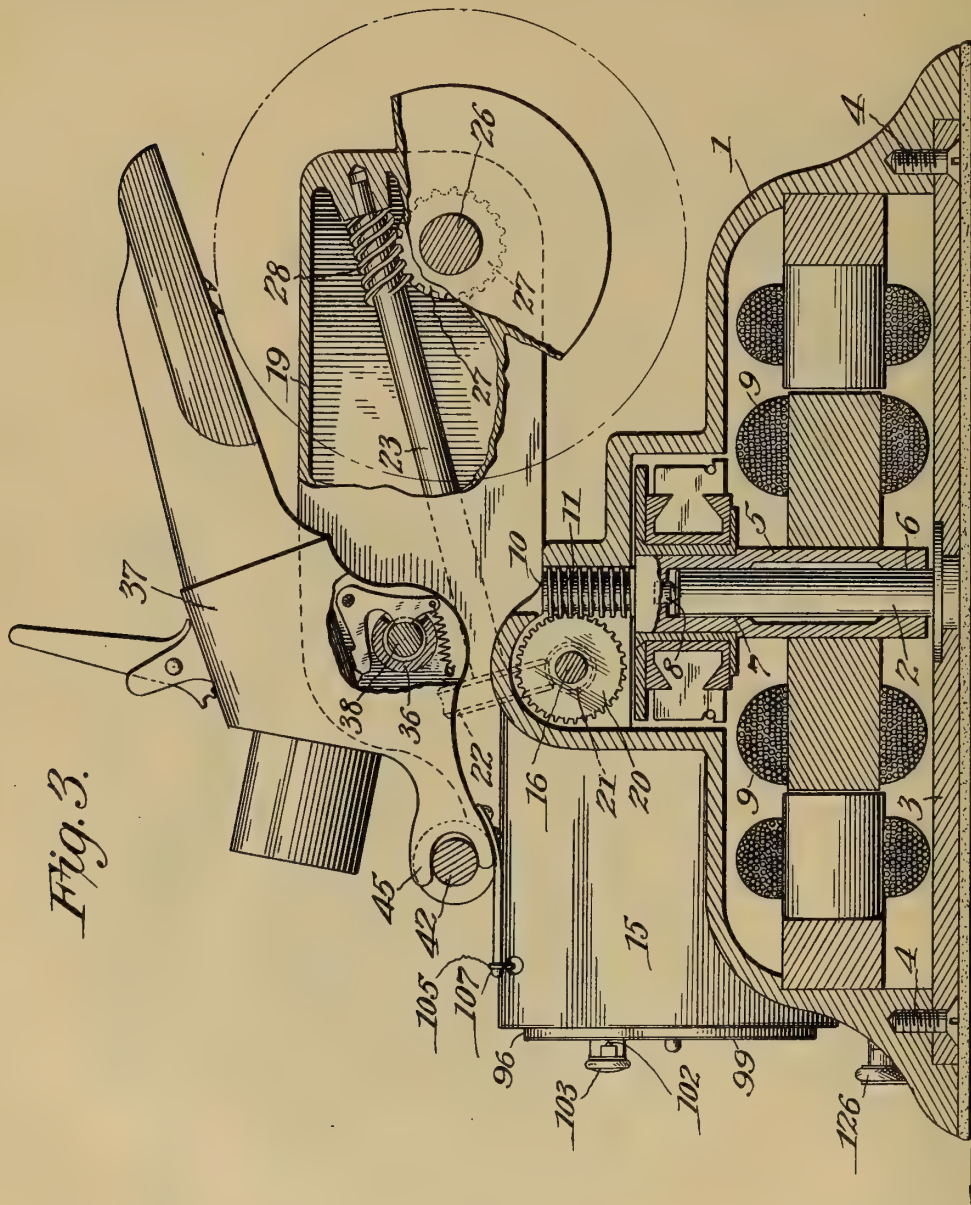


Fig. 3.

Inventor

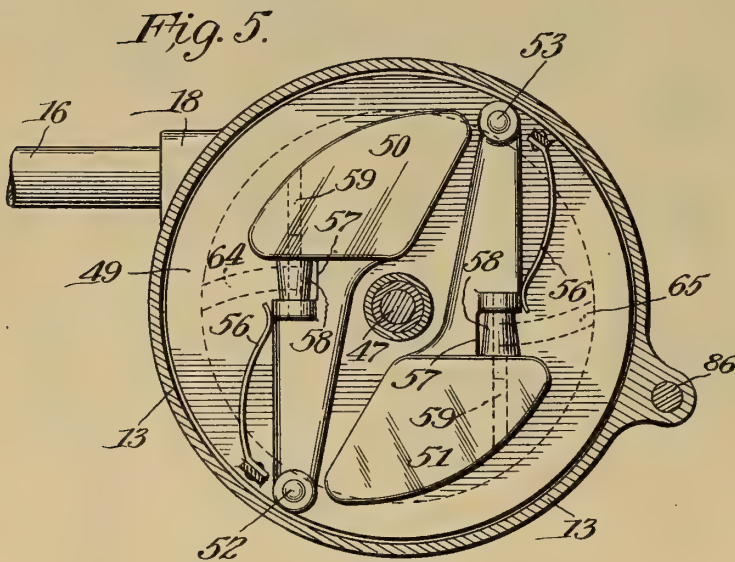
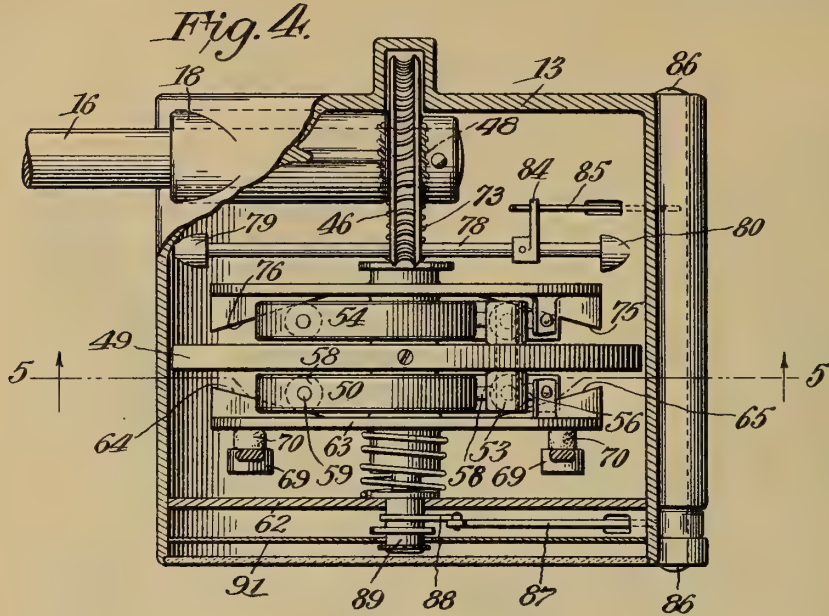
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TALKING MACHINE.
APPLICATION FILED JAN. 24, 1914.

1,214,106.

Patented Jan. 30, 1917.
7 SHEETS—SHEET 4.



Inventor

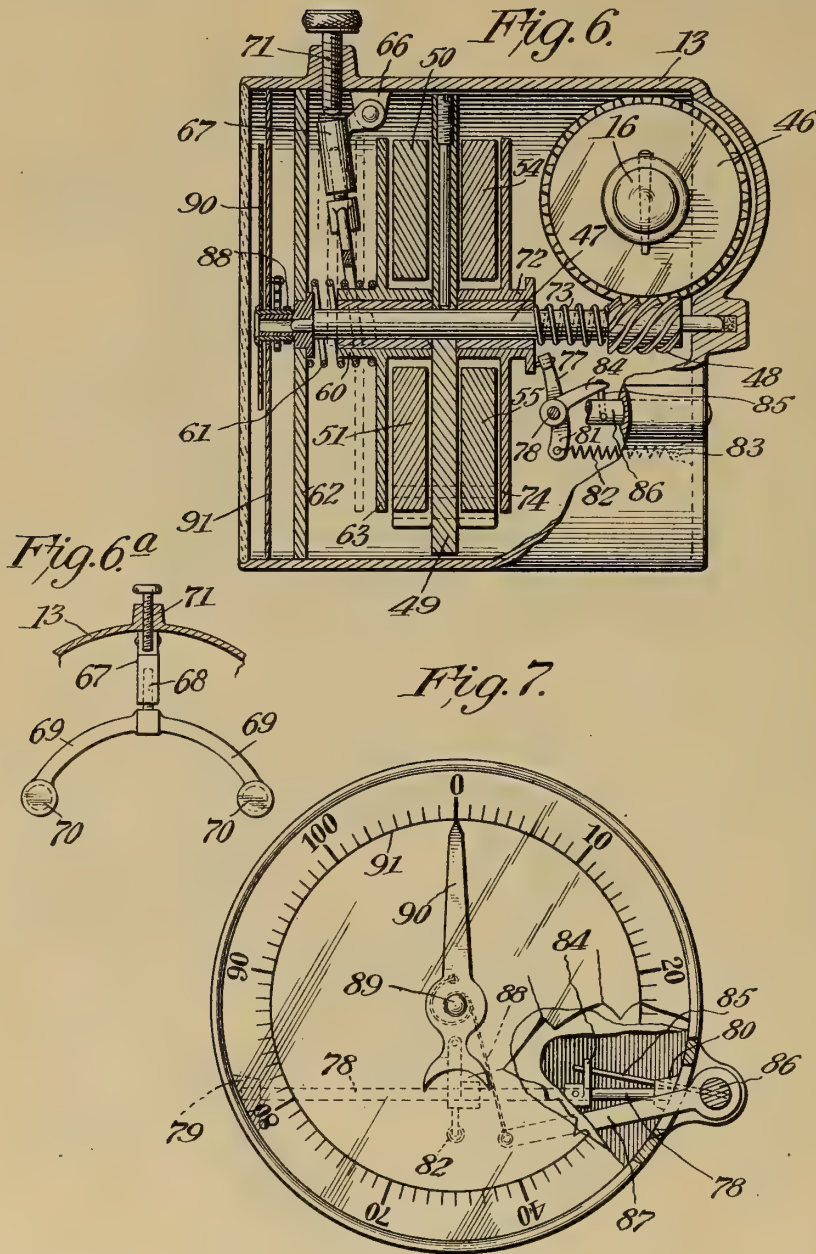
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TALKING MACHINE.
APPLICATION FILED JAN. 24, 1914.

1,214,106.

Patented Jan. 30, 1917.
7 SHEETS—SHEET 5.



Inventor

Witnesses
Jas. H. Anderson
R. C. Fitzhugh.

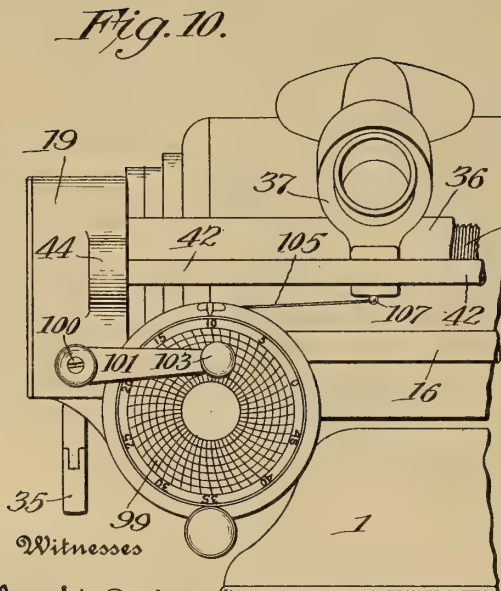
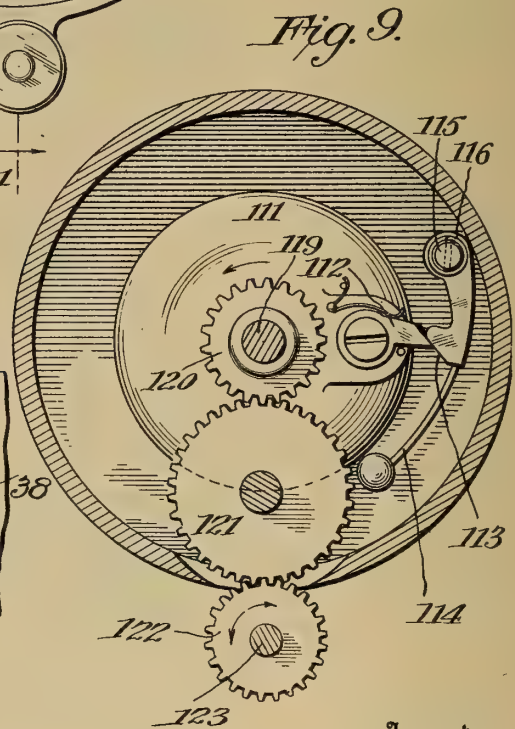
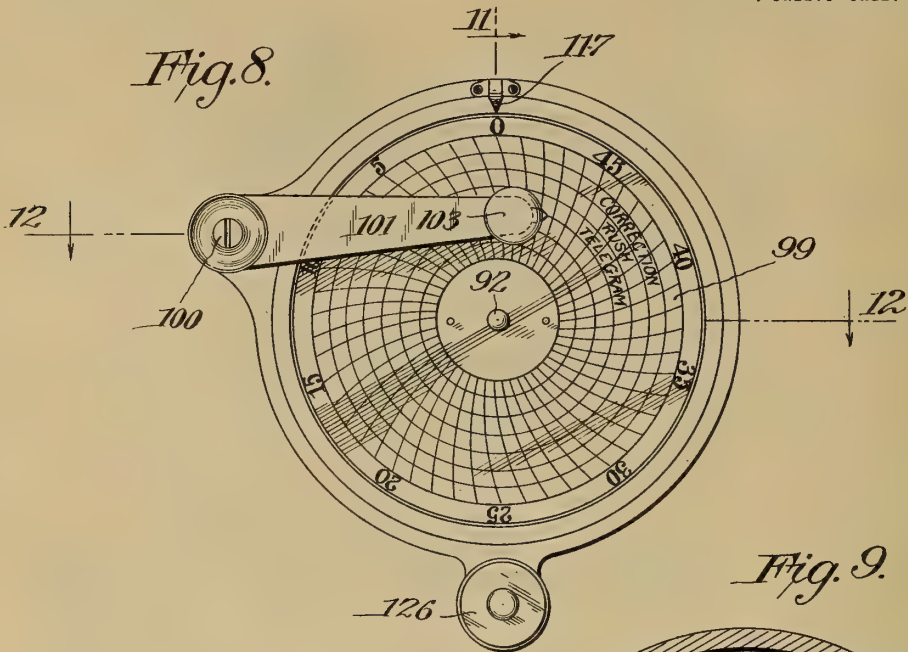
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1,214,106.

Patented Jan. 30, 1917.

7 SHEETS—SHEET 6.



Inventor

Clinton E. Woods.

*Gas. St. Anderson
R.C. Fitzhugh.*

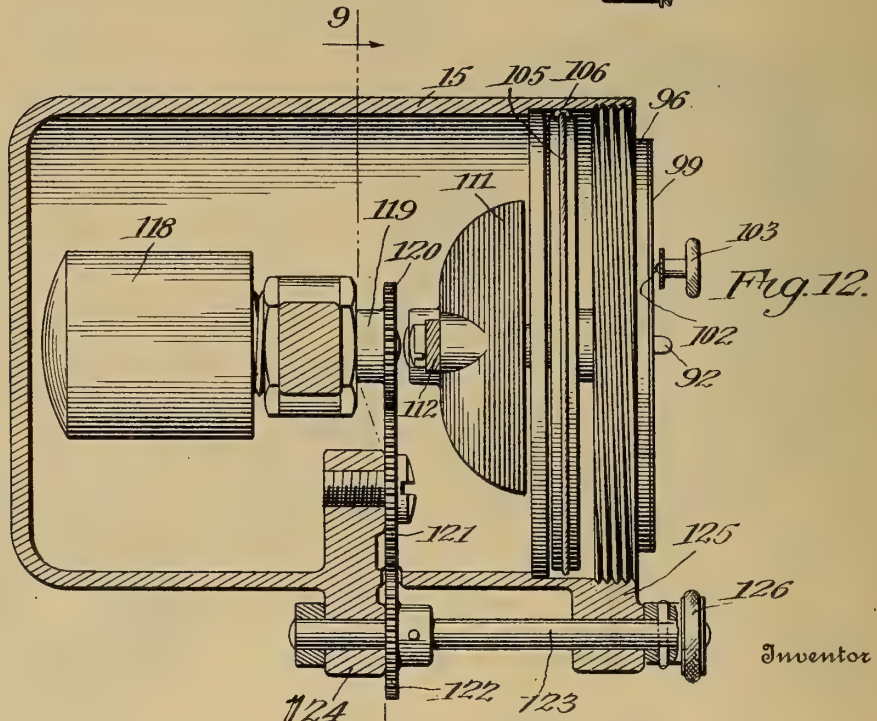
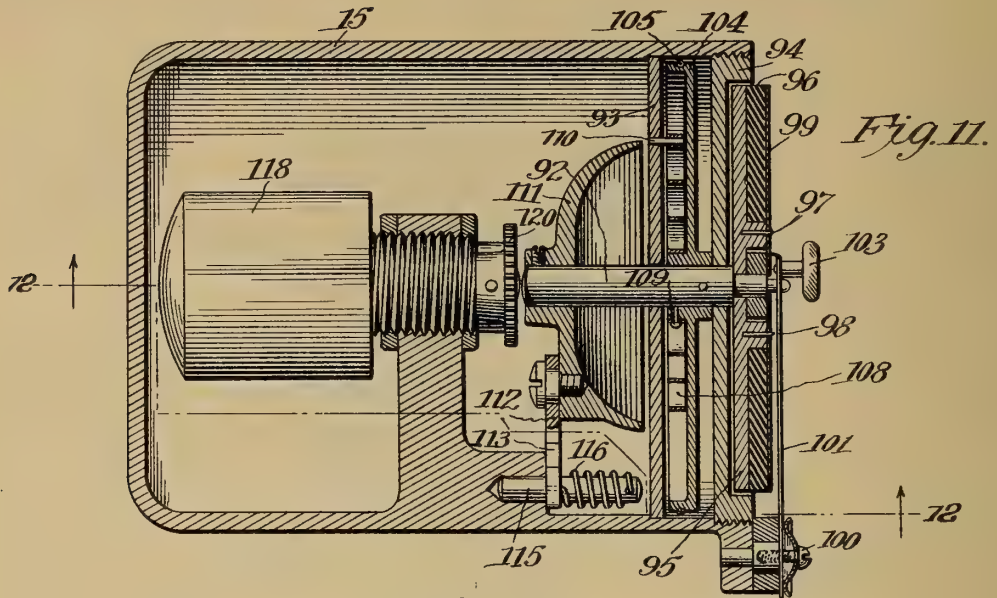
By Messrs. Cameron Lewis & Co.

Attorneys

C. E. WOODS.
TALKING MACHINE.
APPLICATION FILED JAN. 24, 1914.

1,214,106.

Patented Jan. 30, 1917.
7 SHEETS—SHEET 7.



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UNITED STATES PATENT OFFICE.

CLINTON E. WOODS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

TALKING-MACHINE.

1,214,106.

Specification of Letters Patent.

Patented Jan. 30, 1917.

Application filed January 24, 1914. Serial No. 814,174.

To all whom it may concern:

Be it known that I, CLINTON E. WOODS, a resident of Bridgeport, Connecticut, have invented a new and useful Improvement in Talking-Machines, which invention is fully set forth in the following specification.

This invention relates to talking machines, and has for its object to produce a talking machine, or a machine of this character, of simple construction, of great compactness, and easily manipulated.

In its preferred form, and as here shown, it is designed as a machine for desk use in dictating correspondence and the like. But while specifically designed for this dictation purpose, it is nevertheless capable of all of the uses to which talking machines are ordinarily applied, and therefore I desire it to be expressly understood that the invention is not limited to a machine for dictation purposes.

The invention consists in a hollow base of any suitable construction, but preferably similar to the base-piece of an ordinary stand telephone, within which is mounted a motor with a vertical shaft geared to a horizontal shaft outside of the base, which horizontal shaft at one end is geared to and propels the mandrel shaft of a mandrel for supporting an ordinary cylindrical record blank or record, and at the other end is geared to a speed governor of suitable construction. Usually in dictation talking machines, commonly known as dictaphones, it is highly desirable that a correction device should be combined with the machine for the purpose of indicating to the transcriber when corrections are to be made, at what point rush work is recorded on the blank, such as telegrams, etc., and generally any other information that the dictator may wish to pass along to the transcriber. There is, therefore, preferably provided with the present invention a suitable correction device which is located on one side, here shown as the left-hand side of the machine, while a suitable scale and pointer are provided on the opposite side to indicate the speed at which the record blank or record is being driven.

Other special features of the invention will be hereinafter more fully described and then pointed out in the claims.

The inventive idea is capable of receiv-

ing a variety of mechanical expressions, one of which, for the purpose of illustrating the invention, is shown in the accompanying drawings, in which:—

Figure 1 is a front elevation; Fig. 2 is an elevation of the left-hand end of Fig. 1, with the side plate removed and showing the gearing in elevation; Fig. 3 is a view from the right-hand end of Fig. 1, showing the base, however, in medial transverse section; Fig. 4 is a top plan view of the speed governor and speed indicating device, with inclosing casing broken away to disclose the parts; Fig. 5 is a transverse section on the line 5—5 of Fig. 4, looking in the direction of the arrows; Fig. 6 is a view, partly in section, and partly in elevation, showing the means for adjusting the speed and with means whereby movements due to the speed of the governor shaft are transmitted to the indicator point; Fig. 6^a is a detail of the friction pads and supporting means therefor; Fig. 7 is a front face view with parts broken away to show a portion of the interior mechanism; Fig. 8 is a front face view of the correction device; Fig. 9 is a transverse section thereof taken on the line 9—9 of Fig. 12, looking in the direction of the arrows; Fig. 10 is a front elevation of the left-hand end of the talking machine, showing the correction device and the connection thereof to the sound-box carriage; Fig. 11 is a vertical section on the line 11—11 of Fig. 8, looking in the direction of the arrows; and Fig. 12 is a section on the line 12—12 of Fig. 8, looking in the direction of the arrows.

Referring to the drawings, in which similar reference numerals indicate corresponding parts, 1 is a base, preferably of metal and of any suitable shape, but preferably circular in horizontal cross-section, and also hollow.

2 is an upright post centrally and rigidly mounted on a base-plate 3 secured to the frame of the base in any suitable manner, as by the screws 4, to the end that the base-plate may be removed to give access to the shell of the base 1.

5 is a hollow motor shaft having bearing, at 6 and 7, on the bottom and top portions respectively of the post 2, and preferably the said post has formed in the top thereof a depression within which a conically

formed pin 8 bears to take the downward vertical thrust of the motor shaft 5. This shaft is here shown as the motor shaft of any suitable electrical motor 9, and has on its upwardly projecting end a solid portion on which is formed a worm 10 housed in an upwardly projecting part of the base 1, so that the said worm has bearing within the housing, as shown at 11, to receive any side thrust of the worm.

Referring to Fig. 1, 12 is a web formed on the base 1 and serving to secure an abutment 13, here shown in the form of a hollow cylindrical part, within which is mounted a speed-indicating mechanism. On the base 1 opposite to the web 12 is a web 14, by which an abutment 15 is secured to the base 1, which abutment, like the abutment 13, is preferably cylindrical and hollow and within which there is mounted the operating mechanism of the correction device.

Above the base 1 is a horizontal shaft 16 which has bearing at its central portion in upwardly projecting ears 17 (Fig. 1) formed on the upper portion of the base 1, and at its right-hand end has bearing in the abutment 13, as shown at 18 in Fig. 4, while its left-hand end has bearing in the abutment 15, or, preferably as shown, in a part or casting 19 formed integrally with the abutment 15, which casting is in the form of a hollow gear box (see Fig. 2). Keyed to the shaft 16 is a worm-gear 20 (Figs. 1 and 3) meshing with the worm 10 on the shaft 2. On the left-hand end of the shaft 1 which projects into the gear box 19 is a worm 21 (Fig. 2) meshing with a worm-gear 22 loose on a shaft 23 having bearing at 24 and 25 in said gear box. A mandrel shaft 26 projects laterally and to the right from said gear box and is supported on said gear box in a way well known in the art for supporting mandrel shafts, so as to leave one end thereof exposed for the purpose of placing the record blank on the mandrel. Keyed to the mandrel shaft is a worm-gear 27 (Fig. 2) which meshes with a worm 28 formed on the shaft 23 close to its bearing end 25.

Splined on the shaft 23 is one member 29 of a clutch, the other member 30 being secured to or formed integrally with the worm-gear 22, and any suitable or usual means is employed for engaging and disengaging the clutch members to start and stop the machine. As here shown, a collar 31 is formed on the clutch member 29 and within this collar engages one arm 32 of a clutch-actuating lever fulcrumed at 33, while the lower or depending arm 34 of said lever projects downwardly and outwardly through the wall of the gear box 19 and preferably has thereon a finger-piece 35, by means of which the lever may be shifted on its pivot against the action of a spring 36 to close the clutch, the spring acting in the

usual or well-known manner to open the clutch when pressure is relieved from the finger-piece 35. Extending between the abutments 13 and 15 is a guide or way 36 (Fig. 1), on which slides a sound-box carriage 37 of any suitable or desired construction. The guide-way 36, as is common in this art, is in the form of a hollow tube having a longitudinal slot formed on its under side, and within the tubular guide-way 36 is a feed-screw 38 having bearings in the lug 39 forming part of the abutment 13 and in the wall of the gear box 19 forming part of the abutment 15. The end of the feed-screw 38 projects through the wall of the gear box 19 (see Fig. 2) and has keyed there to a worm-gear 40 meshing with a worm 41 on the shaft 23.

The carriage 37 is prevented from turning upon the way 36 by a rail 42 extending between a lug 43 formed on the abutment 13 and a lug 44 formed on the gear box 19, which rail is embraced by the fork-end 45 of the carriage 37 in the usual well-known way.

Speed governor and speed indicator.—Referring to Figs. 4-7 inclusive, 46 is a worm-gear keyed to the shaft 16 within the hollow abutment or casing 13, and 47 is a shaft having bearings in said abutment or casing and on which is formed the worm 48 meshing with the worm-gear 46. On the shaft 47 is keyed a disk 49 and to this disk two weights 50 and 51 are pivoted at the points 52 and 53, respectively, diametrically opposite to each other and adjacent to the periphery of the disk 49, and on the opposite side of the disk 49 are pivoted two weights 54 and 55, which weights are pivoted respectively on the pivots 52 and 53, which preferably extend through the disk 49, so that the two pivots carry the four weights 50, 51, 54 and 55. These weights are all similar in construction and are shaped as shown in Fig. 5, and are normally held thrown inwardly toward the shaft 47 by springs 56, but are thrown outwardly against the tension of said springs when the shaft 47 is revolved. Each of the weights has a cut-away portion 57 within which is mounted a conical anti-friction roller 58 on a pin 59, shown in dotted lines in Fig. 5.

Slidably mounted on the shaft 47 is a sleeve 60, a spring 61 being interposed between said sleeve and the wall 62 of the abutment casing. On the sleeve 60 is a circular flange or disk 63, and on the side of the disk adjacent to the weights 50 and 51 there are formed two cam surfaces 64 and 65, which cam surfaces are shown in full lines in Fig. 4 and in dotted lines in Fig. 5, and are located opposite the anti-friction rollers 57 on the respective weights. The result of this construction is that when the shaft 47 is revolved and the weights 50 and 51 are

thrown outwardly against the tension of the springs 56, the anti-friction rollers 57 acting on the cams 64 and 65 impart a sliding movement to the sleeve 60 and the disk 63, (to the left in Fig. 6,) against the tension of the spring 61, as indicated by dotted lines in Fig. 6, the extent of the sliding movement depending upon the speed at which the shaft 47 is revolved.

Depending from the upper inner face of the abutment casing 13 is a lug 66 (Fig. 6), to which is pivoted an angular lever 67. Mounted to turn in and depend from this lever is a shaft 68 supporting two diverging fork-arms 69, 69, on the lower ends of which are carried the friction pads 70, 70 in front of the disk 63. A micrometer screw 71 (Fig. 6) is screw-threaded into the wall of the abutment casing 13 with its lower end bearing on the angle of the lever 67, whereby the position of the friction pads with relation to the disk 63 is adjusted.

The operation of the device will be readily understood. When the shaft 16 revolves the speed-governor shaft 47, the disk 63 is moved from left to right by the centrifugal action of the weights 50, 51 to bring the disk into contact with the friction pads 70, 70, whereby the speed of the machine is governed in a way well-known in this art. When the speed of the machine decreases, or when the machine is stopped, the spring 61 returns the disk 63 to its normal position, the weights 50, 51 being thrown inwardly toward the shaft 47 by the springs 56. Mounted on the shaft 47 on the opposite side from the sleeve 60 is a sleeve 72 free to slide on said shaft against the tension of a spring 73 having bearing on the sleeve and a suitable abutment, such as the end of the worm 48 on the shaft. On this sleeve 72 is a disk 74 having the cam surfaces 75, 76 (Fig. 4) corresponding to the cam surfaces 64 and 65 on the disk 63, and the weights 54 and 55 act on the cam surfaces 75, 76 to throw the disk 74, and with it the sleeve 72, to the right in Fig. 6 against the tension of the spring 73, when the shaft 47 is revolved.

This movement of the sleeve 72 is employed to actuate a suitable indicating pointer to indicate the speed of the machine through the following mechanism: A lever 77 is keyed to a rock shaft 78 having bearings at 79 and 80 in the wall of the abutment casing 13 (see Fig. 7). One arm 81 of the lever 79 has a spring 82 secured thereto at one end, and at the other end to the casing at 83, which spring acts to hold the upper end of the lever 77 in contact with a flange of the sleeve 72. Keyed to the rock shaft 78 is a lever arm 84 (Figs. 6 and 7) which bears against a lever arm 85 fixed on a rock shaft 86 turning in bearings in the wall of the abutment casing 13. This shaft extends to near the front end of the abutment casing

13, and in front of the partition wall 62 it has secured thereto a lever arm 87, to which is connected one end of a cord 88 wound around and secured at its other end to a shaft 89 to which is secured a pointer 90 operating in connection with a scale 91. When the sleeve 72 is thrown from left to right in Fig. 6, under the influence of the centrifugal weights 54, 55, the shaft 86 is rocked through the lever arms 77, 84 and 85, thereby depressing the lever arm 87 and revolving the shaft 89 clockwise (in Fig. 7) and with it the pointer 90, the amount of this revolution of the shaft being dependent upon the extent of the sliding movement of the sleeve 72 which in turn is dependent upon the speed of the shaft 47 and therefore of the machine.

While I have thus described, with some particularity, the specific construction of the speed governor and speed-indicating device, such specific construction forms no part of the present invention and is not claimed herein, since the same is shown, described and claimed in my Patent No. 1,121,887, granted on the 22nd day of December, 1914.

Correction device.—Referring to Figs. 1 and 8 to 12, there is mounted in the abutment casing 15 a shaft 92 (Fig. 11) having bearing in the walls 93, 94 of said casing, with its forward end projecting outwardly through the wall 94 and having keyed thereon a disk 95 having a facing, as 96, of suitable material like rubber or felt. Two pins 97, 98 project outwardly a slight distance beyond the face of the rubber or felt facing 96, and mounted in front of the facing 96 is a correction disk or blank 99 which is preferably pressed over the pins 97, 98 so that the same puncture it and hold it in proper position. This correction disk has marked thereon a scale dividing the periphery of the disk into equal parts which are numbered from 5 to 50. The lines thus dividing the periphery are drawn from the central portion of the paper disk 99 to the periphery of said disk and are approximately radii of said disk, but for reasons hereinafter described are in the form of an arc of a circle. In addition thereto the surface of the disk is divided into concentric portions by circles of constantly increasing diameter. Pivoted on the side of the abutment casing 15, at 100, is a lever 101 having a point 102 in close proximity to the surface of the paper disk, the lever 101 being slightly elastic so as to permit it to yield toward the paper disk under pressure applied to the thumb-piece 103 to cause the point 102 to perforate the disk. Secured to the shaft 92 between the partitions 93 and 94 is a drum 104 having a cord or flexible metal strip 105 wound thereon and with one end secured to the drum, the other end passing outwardly through an opening 106 in the abutment casing 15 and being secured to the

sound-box carriage 37 at 107 (see Figs. 10 and 12). Within the drum 104 is a spring 108 secured at one end to the hub of the drum at 109 and at the other end to the wall 93 at 110. The rear end of the shaft 92 projects through the wall 93 and has secured thereon a bell 111 carrying a cam lug 112 which engages the cam face 113 secured to a striker 114 mounted to turn on a shaft 115 (Fig. 11) against the tension of a spring 116. This correction device operates as follows: The disk 99 is placed in position on the front face of the device, as shown in Fig. 8, with its zero character opposite a pointer 117, the sound-box carriage 37 being in its extreme left-hand position. During the operation of the machine, as the carriage is advanced from left to right it acts through the cord 105 to revolve the shaft 92 against the tension of the spring 108, the proportion of the parts being such that by the time the sound-box carriage 37 has reached its extreme right-hand position, said shaft 92, and therefore the disk 99, will have made one complete revolution. Assuming that the sound-box carriage has advanced one-half the length of the record tablet and that at this point the dictator wishes to dictate a telegram, it is apparent that the disk 99 will have been given half a revolution and the point thereon marked "25" will therefore be immediately opposite the pointer 117. The dictator thereupon seizes the button 103 of the lever 101 and revolves said lever until it comes opposite the circle having the word "telegram" written therein, and then depresses the button puncturing a hole in the disk at that point. Instead of a puncturing point 102, a marking point, as a pencil point for example, may be readily substituted and the paper disk 99 be marked instead of punctured. If the record be taken off of the dictating machine, the disk 99 is also taken therefrom and is placed on a corresponding machine, with the record, and the transcriber observing that a telegram is recorded on the disk immediately advances the carriage until the point "25" on the disk 99 is opposite the pointer 117 and transcribes what is there recorded. Upon freeing the carriage 37 from the feed-screw, the spring 108 acts to return the disk 99 to its normal position, that is, with the zero point thereon opposite the pointer 117. The position of the cam 112 on the bell 111 is such that it trips the striker 114 just as the carriage 37 has reached its extreme right-hand position, thus serving as a signal that the limit of the record tablet has been reached.

The specific construction of the correction device herein shown and described is not claimed herein, since such construction forms the subject-matter of my Patent No.

1,153,665, granted on the 14th day of September, 1915.

The mechanism of the correction device and the signaling bell occupies only a portion of the space within the abutment casing 15, and I preferably mount in the remaining portion thereof any suitable switch 118 for switching on and off the current from the motor in the base, and which switch is operated by revolving a shaft 119 to make and break contact in any desired manner well-known in the art. For the purpose of giving the shaft 119 the turn necessary, the same has a gear wheel 120 thereon connected by an intermediate gear 121 to a gear 122 on a shaft 123 having bearing in lugs 124, 125 on the abutment casing 15, and said shaft is provided with a knob 126 by means of which the shaft may be turned for effecting the revolution of the shaft 119 to open and close the circuit.

While I have thus described my invention herein with considerable particularity, it is to be expressly understood that the invention is not limited to the details of construction described, nor to the particular proportion of parts shown, since the same may be varied within wide limits and within the terms of the claims hereto appended.

Having thus described my invention, what is claimed is:—

1. In a talking machine, the combination of a hollow base, a motor and motor shaft therein, a sound-record mandrel shaft and a driven shaft supported by said base in parallel relation, worm-gear connections between said mandrel and driven shafts for driving the mandrel shaft from the driven shaft, and worm gear connections between said motor shaft and driven shaft.

2. In a talking machine, the combination of a hollow base, a motor and vertical motor shaft therein, a sound-record mandrel shaft, a sound box feed-screw and a driven shaft all supported by said base parallel to each other, worm-gear connections between said driven shaft and said mandrel shaft and feed-screw, and worm gear connections between said motor shaft and driven shaft.

3. In a talking machine, the combination of a hollow base, a motor within said base, a vertical motor shaft having a worm on its upwardly projecting end, a bearing or support for said worm, a driven shaft having a worm-gear engaging said worm opposite said support, a sound-record mandrel shaft, and worm-gear connections between said driven shaft and mandrel shaft.

4. In a talking machine, the combination of a sound-record mandrel shaft and a sound-box carriage, with a hollow base having a post extending upwardly therein, a hollow motor shaft having bearing on the upper end and the sides of said post, a mo-

tor for driving said shaft, and driving connections between said motor shaft, the mandrel shaft and the sound-box carriage.

5. In a talking machine, the combination
 5 of a hollow base and two oppositely disposed abutments supported by said base, a motor in said base, a speed governor supported on one of said abutments and operatively connected to said motor, a sound-box carriage
 10 moved by the motor, a correction device supported on the other abutment, and operating connections between said carriage and correction device.

6. In a talking machine, the combination
 15 of a hollow base and two oppositely disposed hollow abutments supported by said base, a motor in said base, a speed governor in one of the hollow abutments and operatively connected to said motor, a sound-box carriage moved by the motor, a correction device housed in the other abutment, and operating connections between said carriage
 20 and correction device.

7. In a talking machine, the combination
 25 of a hollow base, a motor therein, a vertical motor shaft having bearing within said base, a horizontal shaft supported on said base, a worm on said motor shaft having a bearing support in the base, a worm-gear
 30 on said horizontal shaft and engaged by said worm opposite said support, a sound-record mandrel shaft and a speed governor shaft supported on said base, and driving connections between said last-named shafts
 35 and said horizontal shaft.

8. In a talking machine, the combination of a hollow base, two oppositely disposed abutments supported by said base, a sound-record mandrel shaft having bearing in but
 40 one of said abutments, a sound-box carriage, a feed-screw therefor having bearings in said abutments, a driven shaft having bearings in said abutments, a motor in said base geared to said last-named shaft between said
 45 abutments, and driving connections between said driven shaft and said feed-screw and mandrel shaft.

9. In a talking machine, the combination of a hollow base, two oppositely disposed
 50 abutments supported by said base, a sound-record mandrel shaft having bearing in one of said abutments only, a sound-box carriage, a carriage-way or support carried by said abutments, a feed-screw within said way, a
 55 driven shaft having bearings in said abutments, a motor in said hollow base and having a vertical shaft projecting upwardly therefrom and geared to said driven shaft between said abutments, and driving connections between said driven shaft and said
 60 feed-screw and mandrel shaft.

10. In a talking machine, the combination of a hollow base and two abutments on said base, a motor within the base, a vertical

motor shaft having bearings in said base, a 65 driven shaft geared thereto and having bearings in said abutments, a speed governor housed in one of said abutments, a sound record mandrel shaft, and driving connections between said driven shaft and the man- 70 drel shaft and between said driven shaft and the speed governor.

11. In a talking machine, the combination of a hollow base, and two hollow abutments thereon, a motor in said base, a motor 75 shaft driven thereby, a driven shaft having bearings in said hollow abutments and connected to said motor shaft, a sound-box carriage, a correction device housed in one of said hollow abutments and operatively con- 80 nected to said carriage, a speed governor housed in the other hollow abutment, and connections between said driven shaft and said speed governor and sound-box carriage. 85

12. In a talking machine, the combination of a hollow base, a motor within said base and having a vertical motor shaft extending therefrom, two oppositely placed abutments on said base, a horizontal driven shaft 90 having bearings in said abutments, a sound record mandrel shaft and a speed governor shaft each having bearings in one of said abutments only, and connections between one end of the driven shaft and the mandrel 95 shaft and between the other end of said driven shaft and the speed governor shaft.

13. In a talking machine, the combination of a hollow base and two oppositely disposed hollow abutments supported thereon, 100 a speed-indicating scale and pointer on the front face of one hollow abutment, a correction disk on the front face of the other hollow abutment and a disk operating device therein, a motor in said hollow base, a 105 sound-record mandrel driven thereby, a speed governor in the one hollow abutment and connected to said pointer, operative connections between said governor and motor, a sound-box carriage moved by said motor, 110 and operative connections between said carriage and correction device.

14. In a talking machine, the combination of a hollow base, a motor and vertical motor shaft therein, two oppositely disposed hollow abutments on said base, a speed governor in one of said abutments, a correction-indicating device mounted on the other abutment and operating devices therefor within 115 said abutment, a sound-box carriage operatively connected to said devices, a sound-record mandrel-shaft, and operative connections between said motor shaft and said speed governor, sound-box carriage and mandrel shaft. 120 125

15. In a talking machine, the combination of a hollow base, a motor therein, two oppositely disposed hollow abutments on said

base, a speed governor in one hollow abutment, a signaling device in the other hollow abutment, a sound-box carriage in operative relation with said signaling device, and operative connections from said motor to said speed governor and to said sound-box carriage.

16. In a talking machine, the combination of a hollow base, a motor and motor shaft therein, a sound-record mandrel shaft and a driven shaft supported by said base in parallel relation, an intermediate shaft extending at right angles to the last-named shafts, worm-gear connections between said driven shaft and said intermediate shaft, and between said intermediate shaft and said mandrel shaft, and operative connections between said motor shaft and said driven shaft.

17. In a talking machine, a motor, a sound-record mandrel, a feed-screw, a speed governor, a driven shaft, means comprising worm-gear connections for driving said mandrel and feed-screw from said shaft, means comprising worm-gear connections for driving said governor from said shaft, and means comprising worm-gear connections for driving said shaft from said motor.

18. In a talking machine, the combination of a hollow base, a motor within said base, a horizontal shaft driven therefrom, a sound-record mandrel, a feed-screw, connections between one end of said driven shaft and

said mandrel and feed-screw, a speed governor, and connections between said governor and the opposite end of said driven shaft.

19. In a talking machine, the combination of a hollow base, a motor within said base, a horizontal shaft driven therefrom, a sound-record mandrel, a feed-screw, worm-gear connections between one end of said driven shaft and said mandrel and feed-screw, a speed governor, and worm-gear connections between said governor and the opposite end of said driven shaft.

20. In a talking machine, the combination of a hollow base, a motor and motor shaft therein, a sound record mandrel shaft, a sound-box feed-screw and a driven shaft supported by said base in parallel relation, an intermediate shaft extending at right angles to the last-named shafts and feed-screw, worm-gear connections between said driven shaft and said intermediate shaft, and between said intermediate shaft and said mandrel shaft and feed-screw, and operative connections between said motor shaft and said driven shaft.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CLINTON E. WOODS.

Witnesses:

J. S. GRIFFITH,
JOHN R. PETRIE.

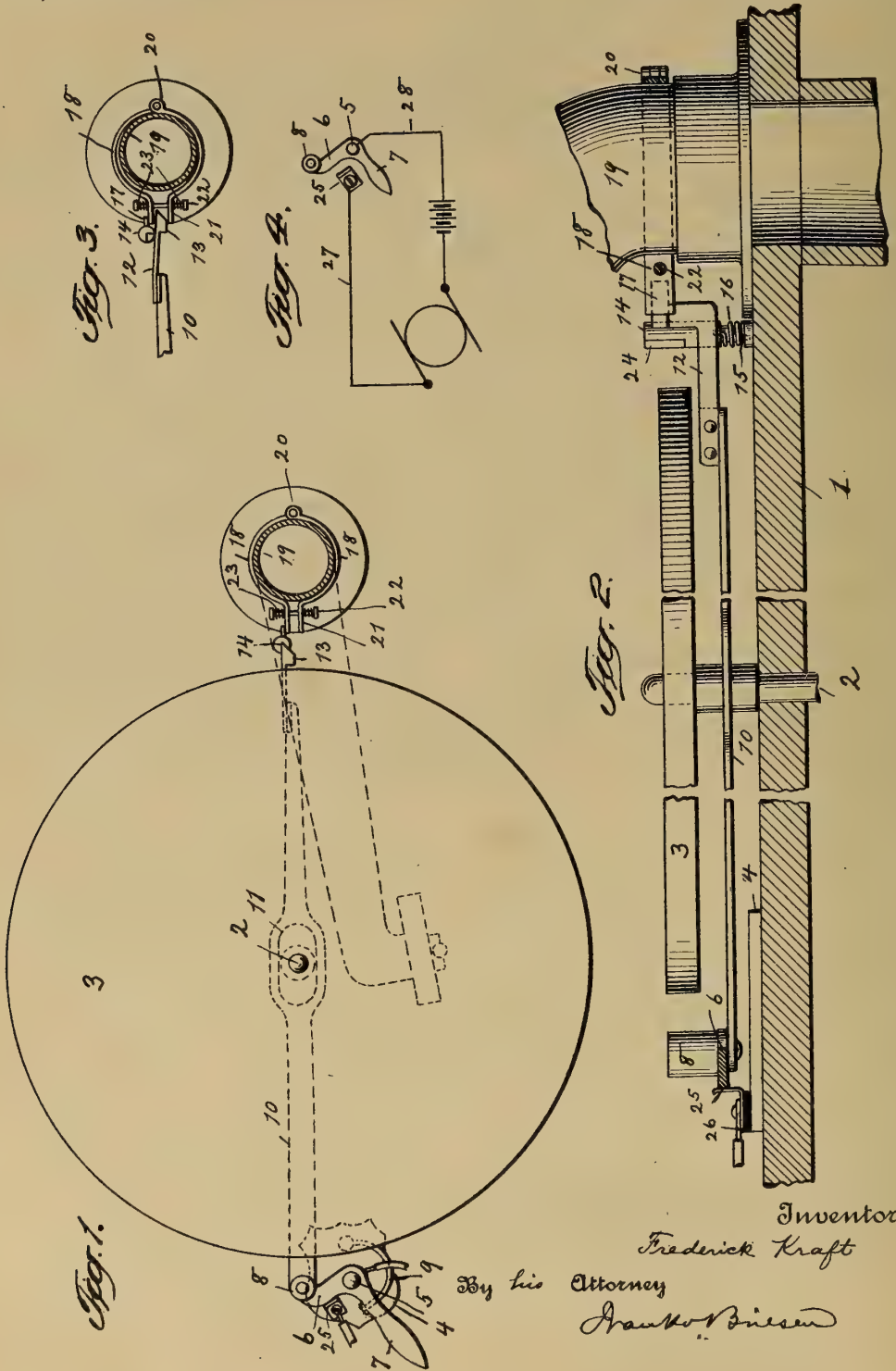
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

BRAKE FOR PHONOGRAPHS,
#1,214,181-----F. Kraft,
Patented-January 30th, 1917.
Filed-August 16th, 1916.

F. KRAFT.
 BRAKE FOR PHONOGRAPHS.
 APPLICATION FILED AUG. 16, 1916.

1,214,181.

Patented Jan. 30, 1917.



Inventor
 Frederick Kraft
 By his Attorney
 Frank W. Bensen

UNITED STATES PATENT OFFICE.

FREDERICK KRAFT, OF HIGHWOOD PARK, NEW JERSEY.

BRAKE FOR PHONOGRAPHS.

1,214,181.

Specification of Letters Patent.

Patented Jan. 30, 1917.

Application filed August 16, 1916. Serial No. 115,125.

To all whom it may concern:

Be it known that I, FREDERICK KRAFT, a citizen of the United States, and a resident of Highwood Park, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Brakes for Phonographs, of which the following is a specification.

This invention relates to a brake of novel construction for phonographs, which is automatically set at the end of the inward sweep of the tone arm. This sweep varies in length for different lengths of records, and means have therefore been devised, for causing the brake to be correctly set irrespective of the length of the tone arm sweep. In other words, the brake will be automatically applied on records of greater as well as of less length or whenever the piece of music is finished.

In the accompanying drawing: Figure 1 is a horizontal section of a brake embodying my invention, taken in a plane above the turn table of a phonograph; Fig. 2, a vertical section partly in side view; Fig. 3, a horizontal section through the tone arm showing adjoining parts, and Fig. 4, a wiring diagram.

The cabinet of the phonograph is furnished with the usual top 1, through which passes the spindle 2, of the turn table 3, which spindle is driven in suitable manner. To top 1 there is secured, a plate 4 to which is pivoted at 5, a brake lever 6, having a handle 7. Lever 6 is provided with a brake shoe 8, of suitable construction which is adapted to be projected against the edge of the turn table 3, by means of a spring 9, which is shown to be secured at one end to plate 4 and at the other end to handle 7. To lever 6 there is pivoted one end of a rod or brake controlling member 10 passing diametrically beneath turn table 3, and having an elongated eye 11 for the accommodation of spindle 2. The other end of rod 10, is provided with a spring arm 12, to which is secured a beveled head 13 constituting a spreading bolt. This head is adapted to engage an abutment comprising a notched sleeve 14 rotatably mounted upon pin 15, that extends upwardly from top 1, the sleeve being influenced by a spring 16. Sleeve 14 is provided with a tail piece 17 which is adapted to be engaged by a split collar or tripping member 18 shiftably encircling the tone arm 19. This collar is formed of two

sections hingedly connected at one of their ends as at 20, while their spaced other ends are bent outwardly as at 21, one of such ends constituting a tripper for tail piece 17. Through ends 21, passes a pin 22, which by means of springs 23, has a tendency to contract the collar upon the tone arm.

The operation is as follows: When the machine is playing, head 13 engages notch 24 of sleeve 14, which will cause rod 10 to be so advanced, against action of spring 9, that brake 8 is held off turn table 3 (Fig. 2). When the tone arm has reached the end of its path, tripper 21 will strike tail 17, so as to turn sleeve 14 (against action of spring 16) and dislodge head 13 from notch 24, the sleeve being by its spring 16 immediately returned to its normal position, after this dislodgment has been effected. The release of the head 13 from the sleeve 14, will effect the release of rod 10, so that spring 9 will now retract the same and swing lever 6 inward to carry brake shoe 8 against turn table 3. As soon as the head 13 has relinquished sleeve 14, it will pass between the ends 21 of collar 18 (Fig. 3) and thus spread the latter against action of springs 23, the collar being thus loosened upon the tone arm 19 but being arrested in position by the interposition of the head 13. A new record is now fitted upon the turn table and the tone arm is swung inward so that the stylo is brought opposite the end of such new record, the movement of the tone arm being not participated in by the collar. The brake is released by hand lever 7, thus pulling head 13 out of collar 18, and causing the latter to be again tightened upon the tone arm by springs 23, while the head will become re-engaged by sleeve 14. The motor is started and the tone arm is swung to the beginning of the record carrying the collar 18 with it, whereupon the piece is played and the operation described is repeated.

It will be seen that the collar 18 will trip the brake controlling means, as soon as the tone arm has reached the end of its path and that the collar will be set automatically in such a manner that it will be carried in due time against the brake controlling means, irrespective of the length of the tone arm stroke. In this way, the brake will be promptly applied at the end of longer as well as of shorter records. In case the turn table is operated by an electric motor, the brake may be so connected to the motor that

the latter is automatically started as soon as the brake is taken off. For this purpose there is provided, a contact 25, which is separated from plate 4 by insulation 26, and is connected to the motor by wire 27 (Fig. 4), while a second wire 28 leads from lever 24 through the source of power to the motor. When the brake is off, the circuit will thus be closed, and the motor started.

10 I claim:

1. A phonograph comprising a turn table, a brake, a tone arm, a tripper mounted on the tone arm and adapted to be normally in operative engagement therewith, and brake
15 controlling means adapted to arrest the tripper and simultaneously break its operative engagement with the tone arm.

2. A phonograph comprising a turn table, a brake, a tone arm, a split collar mounted
20 on the tone arm and adapted to be taken along thereby through frictional contact, and a spreader operatively connected to the brake, said spreader being adapted to arrest the collar, and to simultaneously break its
25 frictional engagement with the tone arm.

3. A phonograph comprising a turn table, a brake, a tone arm, a tripper fitted upon the tone arm, and means operable by the brake for loosening said tripper to permit an independent movement of the tone arm.

4. A phonograph comprising a turn table, a brake, a tone arm, a tripping member movably mounted thereon, and means operable by the brake for simultaneously loosening and arresting the tripping member. 35

5. A phonograph comprising a turn table, a brake, a brake setting rod, a tone arm, a split collar movable on the tone arm, and a head carried by the brake setting rod and adapted to simultaneously spread and arrest
40 the collar.

6. A phonograph comprising a turn table, a spring-influenced brake, a rod connected thereto, a head carried by the rod, a movable abutment adapted to be engaged by the
45 head, a tone arm, a collar movably fitted upon the tone arm and adapted to be engaged by the head, said collar being adapted to actuate said abutment.

7. A phonograph comprising a turn table, a spring-influenced brake, a rod connected thereto, a head carried by the rod, a spring-influenced abutment having a tail piece and adapted to be engaged by the head, a tone
50 arm, and a collar movably fitted upon the tone arm and adapted to be engaged by the head, said collar being adapted to engage the tail piece. 55

FREDERICK KRAFT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PHONOGRAPH TURN-TABLE,
#1,214,191-----John P. Leach,
Patented-January 30th, 1917.
Filed-September 20th, 1916.

J. P. LEACH.
 PHONOGRAPH TURN TABLE.
 APPLICATION FILED SEPT. 20, 1916.

1,214,191.

Patented Jan. 30, 1917.

Fig. 1.

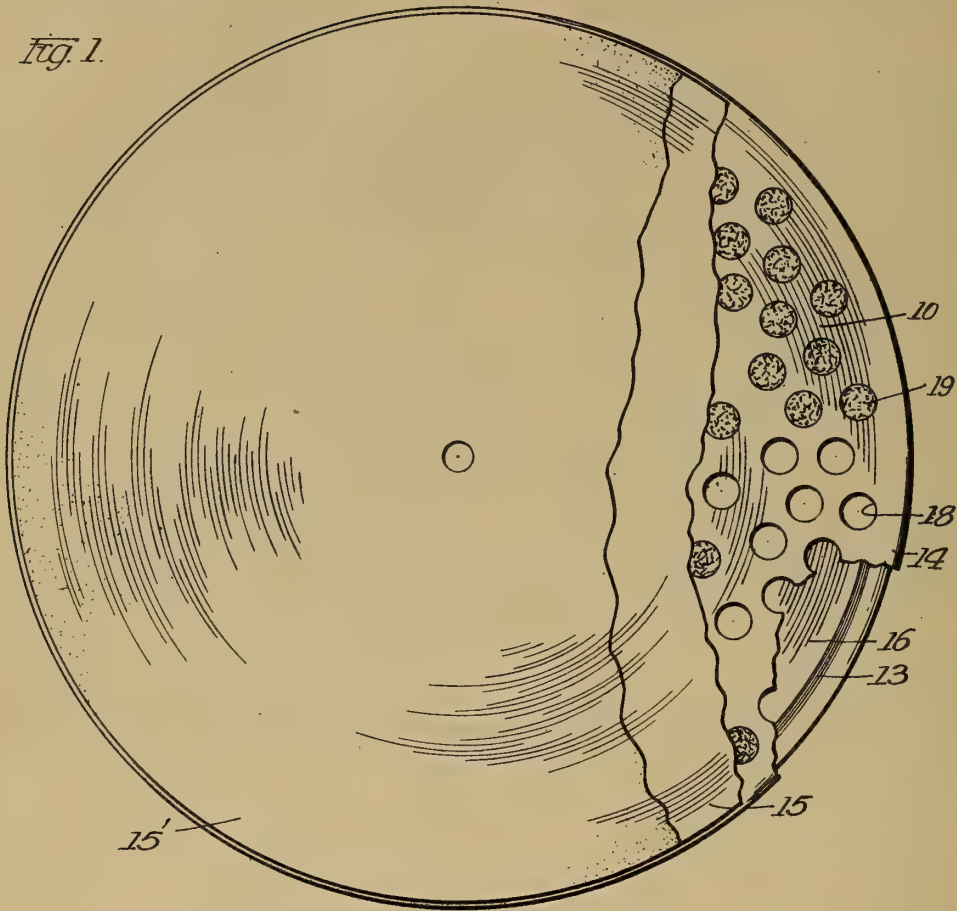


Fig. 2.

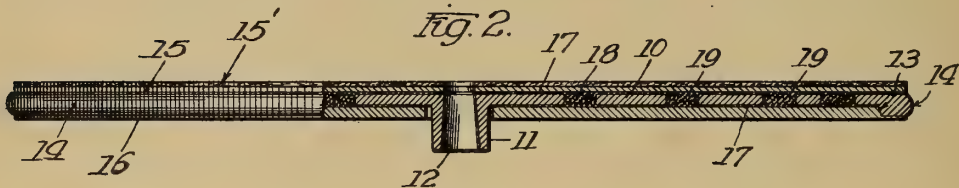
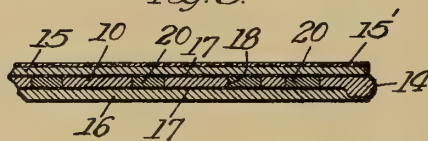


Fig. 3.



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PHONOGRAPH TURN-TABLE.

1,214,191.

Specification of Letters Patent. Patented Jan. 30, 1917.

Application filed September 20, 1916. Serial No. 121,100.

To all whom it may concern:

Be it known that I, JOHN P. LEACH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Phonograph Turn-Tables, of which the following is a specification.

My invention relates to improvements in sound reproducing instruments and more particularly to a disk-record supporting plate, generally called a turn-table, which is used on all types of talking machines in which the popular wafer-like disk-records are used in conjunction with a diaphragm and stylus for reproducing music or other sounds.

In the talking machines with which I am familiar the turn-table is carried upon the upper end of a vertical driving spindle and is formed of pressed steel or coat metal, the table being designed with the sole object of providing a record support and drive.

The object of my invention is to provide a turn-table to be used in place of the table furnished by the manufacturer and which will enhance and enrich the tones of the sounds produced by the instrument and reproduce with greater fidelity the tones of the instrument, or voices originally recorded upon the disks.

Another object of my invention is the provision of such a turn-table having greater resonance than those now in use and which will respond to the vibrations caused in the reproducing diaphragm by the stylus following the irregularities in the grooves of the record, thus augmenting or increasing the volume of sound produced by the instrument.

A still further object of the invention is the provision of a turn-table which will generally improve the qualities of the sounds and make them more pleasing to the ears of a listener.

Still other and further objects will become apparent to those skilled in the art from a consideration of the following description and drawing, wherein:—

Figure 1 is a plan view of my improved turn-table with parts broken away to illustrate its composite structure. Fig. 2 is a side elevation with parts broken away on a diametrical plane. Fig. 3 is a fragmentary sectional view illustrating a modified form of construction.

Referring to the drawings, wherein I have illustrated my improved turn-table in its preferred form, the numeral 10 indicates a metallic disk having a central hub 11, in this particular instance the hub having a taper bore 12 for mounting on the upper end of the drive spindle of a Pathephone. This hub construction obviously may be changed for mounting the table upon the differently formed spindles of other talking-machines.

The upper surface of the metallic disk, which preferably is of brass or bronze, is flat, whereas, its lower surface, formed parallel with the upper face, terminates in a peripheral shoulder 13 forming an annular rim or flange 14 around the periphery of the plate.

Upon both the upper and lower faces of the metallic plate I have mounted thin wooden disks 15 and 16, preferably of hard wood having good resonant qualities. These disks are intimately united to the metal plate by films 17 of glue or cement. The upper disk 15 is of equal thickness throughout, extending close to the periphery of the plate, whereas the lower disk is thinned out at its peripheral portion to overlie the annular flange 14 of the plate, the two disks therefor covering the entire surface of the metal plate except its peripheral edge. A layer of felt 15' is applied to the upper disk 15 to provide a frictional surface upon which to place the record disk.

A plurality of holes 18 are formed in the metallic plate, materially reducing its weight, and providing communicating spaces through which the two wooden disks may be intimately connected. In the preferred form of the invention these openings 18 are filled with a composition 19 of saw-dust and glue acting as a binder to aid in cementing the wooden disks in place and at the same time intimately connecting them with a wooden medium.

In the modified form of construction illustrated in Fig. 3, I have shown the openings 18 as being filled with wooden plugs 19 which serve the same purpose as the saw dust fillers, forming, however, a somewhat more rigid connection between the wooden disks, though obviously presenting somewhat greater difficulties from the manufacturing standpoint.

I have endeavored to explain some of the reasons underlying the improvement which

I have made, though it may be that other theories and reasons will more accurately account for the very noticeable improvement in the reproduction of sound accomplished by the use of my invention.

Whereas I have illustrated and described my improved structure in what I now consider to be a preferred form, together with a possible modification, it is to be understood that many changes and modifications may be made without, however, departing from the spirit of the invention or the scope of the appended claims.

Having described my invention, what I claim is:—

1. A turn-table for talking machines comprising the combination with a metallic plate, of a pair of thin wooden disks mounted on its upper and lower surfaces and in intimate contact therewith.

2. A turn-table for talking machines comprising the combination with a metallic disk having a plurality of openings therein of a pair of thin wooden disks mounted on the upper and lower surfaces thereof, and

a wooden connector filling said openings and joining the wooden disks.

3. A turn-table for talking machines comprising the combination with a metallic disk having a plurality of openings therein, of a pair of thin wooden disks mounted on the upper and lower surfaces thereof, and a composition of comminuted wood with a binder filling said openings and joining the wooden disks.

4. A turn-table for talking machines comprising the combination with a relatively thick metallic disk having a plurality of openings therein of a pair of relatively thin fibrous disks mounted on the upper and lower surfaces thereof, and a composition of fibrous particles and a binder filling said openings and joining the fibrous disks.

In testimony whereof I hereunto set my hand in the presence of two subscribing witnesses.

JOHN P. LEACH.

In the presence of—

STANLEY W. COOK,

MARY Y. ALLEN.

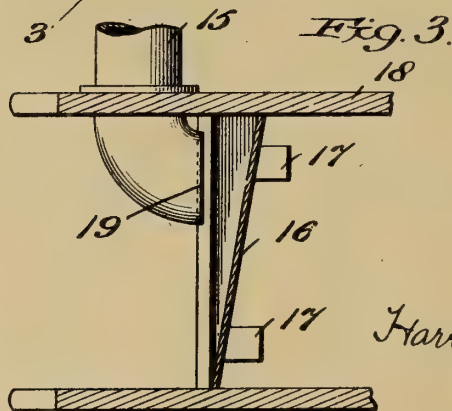
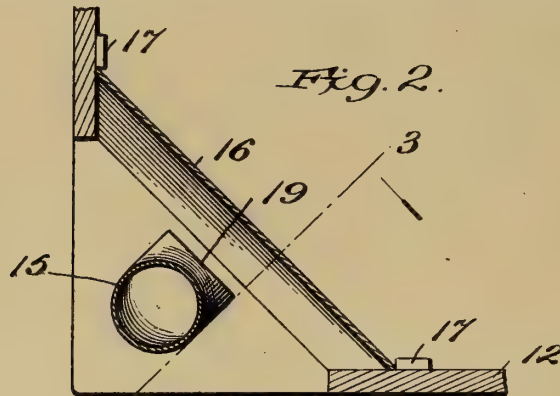
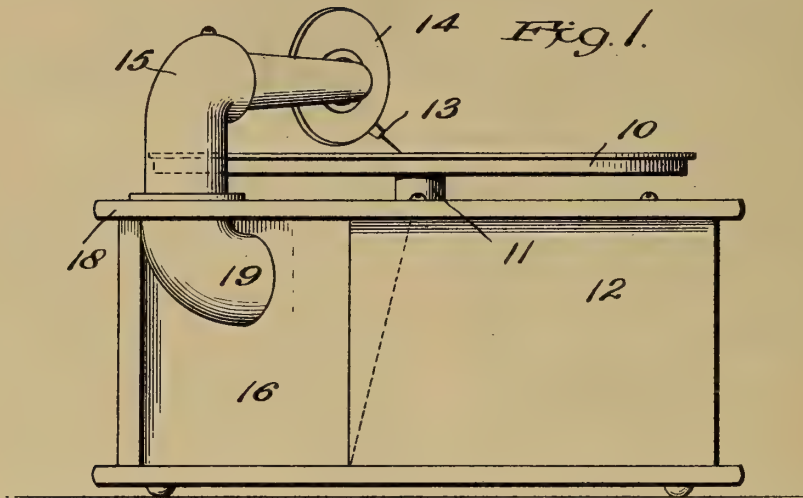
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

#1,214,304-----TALKING-MACHINE,
-----Harry W. Hess,
Patented-January 30th, 1917.
Filed-August 7th, 1914.

H. W. HESS.
TALKING MACHINE.
APPLICATION FILED AUG. 7, 1914.

1,214,304.

Patented Jan. 30, 1917.



Witnesses:
Katherine C. Mead.
Geo. T. Byrne.

Harry W. Hess
Inventor

By his Attorney
William, Lindsta and Mackay

UNITED STATES PATENT OFFICE.

HARRY W. HESS, OF NEW YORK, N. Y.

TALKING-MACHINE.

1,214,304.

Specification of Letters Patent. Patented Jan. 30, 1917.

Application filed August 7, 1914. Serial No. 855,654.

To all whom it may concern:

Be it known that I, HARRY W. HESS, a citizen of the United States, residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Talking-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention has relation to certain improvements in talking machines, whereby the desired degree and quality of resonance for magnifying the production of sound may be obtained.

The principal object of my invention is the provision of improved resonant means of an inexpensive character, whereby the disadvantageous effects of horns and similar structures are obviated.

The invention is illustrated in a number of preferred forms in the accompanying drawings, wherein—

Figure 1 is a side elevation of one embodiment of the invention, Fig. 2 is a horizontal sectional view and Fig. 3 is a vertical section on the line 3—3 in Fig. 2.

In the drawings, the usual revolving platform is shown at 10, mounted upon the revoluble shaft 11, driven by a motor within the box 12. The stylus 13 acts upon a diaphragm in the holder 14 supported upon a hollow tone arm 15, and moving over the revolving record in a well known manner.

While I have shown the invention as applied to a moving diaphragm holder and a flat record, it is to be understood that I do not limit myself to the embodiment of my invention in connection with this particular type of machine. Any machine having a tone arm and a box upon which it is mounted is capable of being constructed in accordance with my invention.

The invention in one aspect, broadly considered, consists in forming one of the walls of the motor box upon which the record is carried while in use so that it provides the resonating agent or vibrating board. The

sound waves gathered by the tone arm are then projected against this resonating agent, and rebound therefrom freely and without lateral confinement.

In the form of my invention shown in Fig. 1 a suitable vibrating board 16 is inserted in one corner of the box 12, being preferably slightly inclined, as made clear in Figs. 2 and 3, and having its edges suitably secured to the main sides of the box, as by gluing, for instance. The reinforcing strips 17 may be used to brace the edges of the board 16.

As shown in Figs. 1 and 3, the tone arm passes down through the cover 18, of the box, and is turned so that its opening 19 faces the board 16, thus projecting the sound against the same. The exact angle of inclination of the pipe opening is not material, so long as it carries the sound waves against the vibrating board and makes the resonance of the latter available.

The quality and volume of tone produced by employment of resonating agents made in accordance with my invention are greatly superior to those produced by the usual horns, whether placed within the supporting box or outside of it.

Various changes may be made in the embodiment of my improvements without departing from the scope of my invention, and I do not limit myself to the details herein shown and described.

What I claim is—

1. In a talking machine, a box for accommodating the usual motor and having a resonant wall so placed as to afford no material obstruction to lateral transmission of sound, and a tone arm carried by said box and so placed as to project sound waves against the outer surface of said wall, substantially as 90 described.

2. In a talking machine, a box for the motor having a resonant wall placed across a recess at one corner thereof, and a tone arm extending downward through the projecting top of said box, so as to project sound waves against the outside of said resonant wall, substantially as described.

3. In a talking machine, a box for the motor having a resonant wall placed across a recess at one corner thereof in an inclined position, and a tone arm projecting downward through the projecting top of the box and having its lower extremity turned toward said wall, substantially as described.

In testimony whereof, I affix my signature, in presence of two witnesses.

HARRY W. HESS.

Witnesses:

KATHARINE C. MEAD,
H. S. MACKAYE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

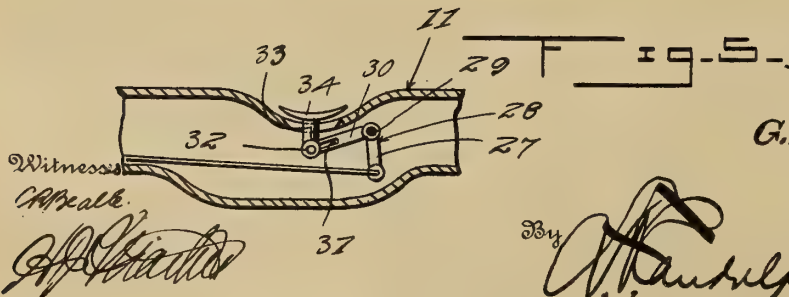
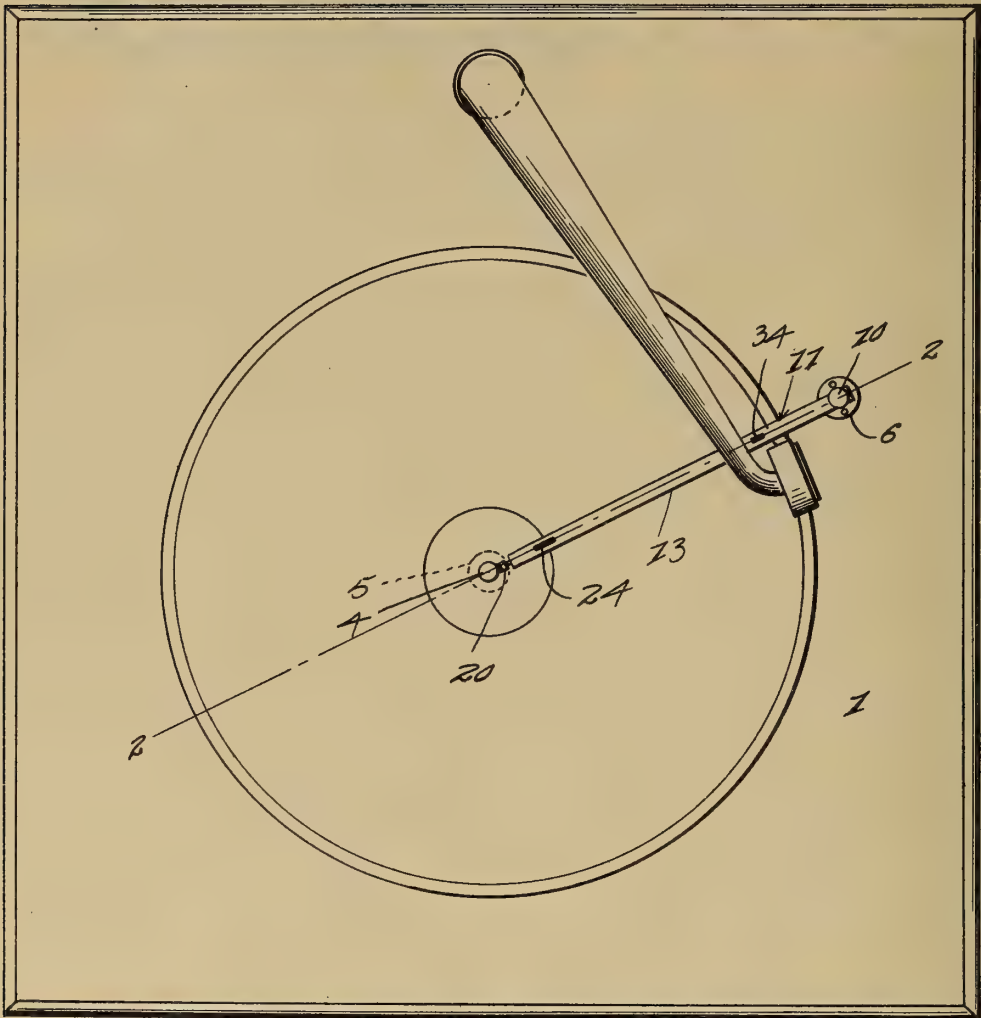
REPEATER ATTACHMENT FOR
PHONOGRAPHS,

#1,214,352-----George L. Minns,
Patented-January 30th, 1917.
Filed-August 19th, 1916.

1,214,352.

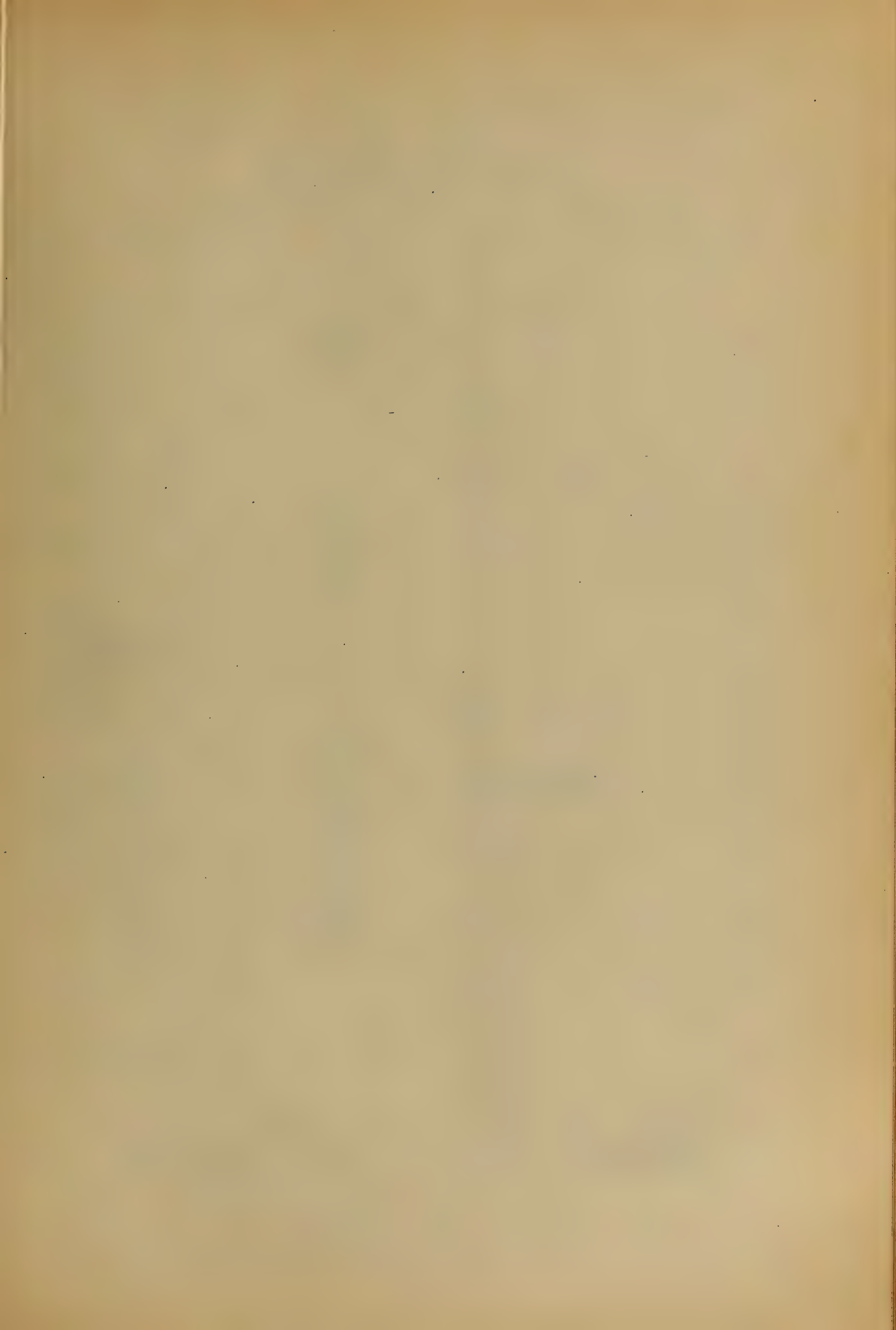
2 SHEETS—SHEET 1.

19-1



Inventor
G. L. Minns.

By *A. Randolph, Jr.* Attorney



1,214,352.

Technical drawing of a mechanical device, likely a valve or actuator, showing a side view and a cross-sectional view. The side view (top) shows a long, thin component (1) with a central section (2) and a flange (3). A rod (4) passes through the center, with a nut (5) and a washer (6) at one end. A spring (7) is attached to the rod. The cross-sectional view (bottom) shows the internal components, including a piston (18) and a valve (19). The drawing is labeled with various numbers (1-27) and includes a signature 'By' and a date '1911'.

C. Peck.

John A. Smith

By *A. A. Humphreys, Jr.* Attorney

UNITED STATES PATENT OFFICE.

GEORGE L. MINNS, OF CLEVELAND, OHIO.

REPEATER ATTACHMENT FOR PHONOGRAPHS.

1,214,352.

Specification of Letters Patent.

Patented Jan. 30, 1917.

Application filed August 19, 1916. Serial No. 115,896.

To all whom it may concern:

Be it known that I, GEORGE L. MINNS, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Repeater Attachments for Phonographs; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to new and useful improvements in repeater attachments for phonographs and the principal object of the invention is to provide a device which may be attached to an ordinary phonograph using a disk record which is adapted to return the reproducer to playing position after the record has been completed.

Another object of the invention resides in the provision of a novel means for raising the tone arm to cause the same to move back to playing position after the record has been played.

A still further object of the invention is to provide a device consisting of a bar attached at its outer end to a post and carrying at its inner end a latch mechanism for engaging a post at the center of the record which is screw threaded so that when said latch is in engagement and the record in motion, the inner end of the bar will be raised to lift the tone arm into such position as to cause the stylus to disengage the record and after lifting said tone arm up to or beyond a predetermined point it will be seen that the same will gravitate back to starting position and engage another latch mechanism which will allow the bar to descend to original position.

With these and other objects in view the invention consists in the novel combination and arrangement of parts which will be fully set forth in the following specification and accompanying drawings, in which:—

Figure 1 is a top plan view of a phonograph showing this attachment in place thereon. Fig. 2 is an enlarged sectional view on line 2—2 of Fig. 1. Fig. 3 is an enlarged longitudinal sectional view of the traveler bar over which the tone arms move. Fig. 4 is a horizontal sectional view on line 4—4 of Fig. 2. Fig. 5 is an enlarged fragmentary sectional view through the traveler bar illustrating one of the latch mechanisms,

and Fig. 6 is an enlarged sectional view on line 6—6 of Fig. 2.

Referring to the drawings the numeral 1 designates the phonographic box of ordinary construction provided with the usual turn table 2 having the ordinary central post 3 which is connected to a suitable driving mechanism by means of which the turn table is rotated. A threaded sleeve 4 is fitted over the upper end of said post and provided at its base with a flange 5.

Attached to and extending upwardly from the box 1 adjacent the periphery of the turn table 2 is a post 6 provided with an internally screw threaded bore 7 into which a screw 8 is threaded. This screw 8 is surrounded by a compression coil spring 9 and the head 10 of said screw is seated on the upper side of the traveler bar which will be more fully hereinafter described.

The traveler bar above referred to is designated by the numeral 11 and is provided at one end with an opening 12 through which the screw 8 extends and this bar is supported on the upper end of the spring 9 as clearly shown in Figs. 2 and 6. This traveler bar 11 comprises a tubular body 13 formed intermediate its ends with a depression 14 which is arranged so that when said bar is in place the depression will come in direct alinement with the outer groove of the playing surface of the record. Formed within the body 13 near the end opposite that which is connected to the screw 8 is an inwardly extending annular flange 15 forming a central guide opening 16 through which the toothed latch member to be more fully hereinafter described is passable. Formed centrally of the upper side of the depression 14 is an opening 17 through which the stem of the latch button is slidable. A suitable slot 18 is formed near the inner end of the body 13 and this slot is to accommodate the box member for holding the toothed bolt away from engagement with the sleeve 4.

The toothed bolt above referred to consists of a stem 19 provided at its outer end with a head 20 which is provided on its outer face with a plurality of transversely extending ribs or teeth for coöperation with the threads of the sleeve 4. The stem 19 is slidable through the opening 16 and a spring 21 bears against the annular rib 15 and the head 20 to normally urge the bolt outwardly. The inner end of the stem 19

is provided with an upwardly extending lug 22 for coöperation with the dog 23 formed on the end of the lever 24 which is pivoted in the slot 18. A suitable leaf spring 25 normally urges the longer end of the lever 24 upwardly so as to move the dog 23 into engagement with the lug 22. It will thus be seen that when the device is in the position shown in Fig. 3 the head 20 will be held out of engagement with the threaded sleeve. It will also be seen that the lever 24 is curved upwardly to form a seat in which the tone arm when at its innermost limit of travel engages.

Connected to the inner end of the bolt 19 is a rod 26 which extends through the tubular body 13 and has pivotally connected to its inner end the arm 27 of a bell crank designated generally by the numeral 28 which is pivoted as shown at 29 within the depressed portion 14 of the bar 13 and the forwardly extending arm 30 of said bell crank is provided with a slot 31 for the reception of the pivot pin 32 by means of which the lower end of the stem of the button designated by the numeral 33 is pivoted to the bell crank. The upper end of the stem of the button is provided with a head 34 which is curved to form a seat in which the tone arm rests when at starting position. It will thus be seen that when the tone arm is set at starting position the same will operate to move the bell crank into such a position as to withdraw the bolt out of engagement with the sleeve 4.

It will be apparent from the foregoing that in use the tone arm rests when in starting position directly over the latch button 34 and as the record rotates, the tone arm travels inwardly toward the center of the record and toward the latch 24. After the record has been played it will be seen that the tone arm will have been carried into engagement with the latch 24 and thus operating the same to release the bolt 19 and allow the heads 20 to engage the threaded sleeve 4 which due to the continuous rota-

tion of the turn table and disk will carry the end of the arm 11 upwardly until it reaches such position that the tone arm will by gravity travel to its original position and drop into the depression formed in the arm 11 thereby engaging the head 34 and causing the bell crank 28 to be operated to exert pull on the rod 26 and thereby withdraw the bolt 19 and allow the end of the arm 11 to drop to its original position. In this way it will be seen that the operation may be repeated until stopped by the user.

While in the foregoing there has been shown and described the preferred embodiment of this invention, it is to be understood that such changes may be made in the combination and arrangement of parts as will fall within the spirit and scope of the invention as claimed.

What is claimed is:—

The combination with a phonograph including a turn table, a central post in the turn table, a tone arm, a record on the turn table and a sound box on the tone arm, of a horizontally disposed traveler bar positioned beneath the tone arm, a sleeve fitted over the central post of the turn table and being provided with external screw threads, means adjustably supporting the outer end of the traveler bar and a toothed bolt at the inner end of the traveler bar for engagement with the sleeve so that when the sleeve rotates and the bolt is in contact therewith the traveler bar will be raised, a spring for raising said bolt into engagement with the sleeve, a latch for holding said bolt out of engagement with the sleeve, said latch being mounted at the inner end of the traveler bar and a push button at the opposite end of the traveler bar to pull the bolt back when the tone arm is in starting position.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE L. MINNS.

Witnesses:

ARCHIBALD RAYBOULD,
DAVID ROWLER.

STOPPING MECHANISM FOR PHONOGRAPHS,
#1,214,806-----W. A. Lucker,
Patented-February 6th, 1917.
Filed-July 22nd, 1915.

Patented Feb. 6, 1917.

UNITED STATES PATENT OFFICE.

WILLIAM A. LUCKER, OF ST. PAUL, MINNESOTA.

STOPPING MECHANISM FOR PHONOGRAPHS.

1,214,806.

Specification of Letters Patent.

Patented Feb. 6, 1917.

Application filed July 22, 1915. Serial No. 41,401.

To all whom it may concern:

Be it known that I, WILLIAM A. LUCKER, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Stopping Mechanism for Phonographs.

This invention has for its object the automatic shutting off of the brake member of a phonograph, and provides means whereby the brake member may be operated as soon as a record has been finished, whether that record be long or short.

With this and incidental objects in view the invention consists of certain novel features of construction and combination of parts, the essential elements of which are hereinafter described with reference to the drawing which accompanies and forms a part of this specification.

In the drawing Figure 1 is a plan view of a conventional phonograph equipped with mechanism embodying my invention, and Fig. 2 is a plan view partly in section of an attachment readily and easily applied to machines of appropriate design. Fig. 3 is a side view of the same attachment, the line X X indicating where the section of the stem 9 is taken in Fig. 2. Fig. 4 is a section of the dial cover plate and part of the stem and screw illustrating the method of clamping the cover plate and dial together. Fig. 5 is an enlarged plan view of the cover plate showing, in dotted lines, the numerals on the dial below the cover plate, and leaving the numeral 2 exposed through an aperture in the cover plate.

My preferred form of construction as illustrated in the drawing is applied to a phonograph of conventional construction, comprising a square casing wherein is mounted the actuating mechanism of the machine, a rotatable record support 4 being provided at the upper side of the casing.

A starting lever 1 is shown, through the medium of which the reproducing mechanism is released for operation, as will be understood by those skilled in the art.

A brake integral with or carried by the lever 1 is adapted to stop the sound reproducing mechanism after the rendition of a record when freed from the latch 2.

The brake member, in the operation of the machine, at the present time, is automatically actuated by means of an arm such as

7, which is fixed to an oscillatory post 6, the latter being directly connected with the sound box or stylus of the machine so that as the sound box or stylus traverses the record, the free end of this arm is gradually moved toward the latch 2, contacting therewith so as to cause the stopping of the machine when the needle of the sound box or stylus has reached the end of the record. Inasmuch as all records are not of the same length, it is evident that if this arm is so positioned with respect to the operating mechanism that it will cause the stopping of the machine when a long record has been completed, in the case of a short record it will allow the mechanism to run a considerable length of time after the record is completed and thus allow the sound reproducing means to give out a grating and disagreeable sound.

I apply as an actuating arm a simple attachment that can readily and easily be applied to all machines of proper design, either at the factory, or after the machine has already been put to use. This attachment comprises an arm 7, Fig. 2, adapted to register with and be driven by the post 6, and which is cut away to fit the milled end of shaft 6 as at 8, and carries a stem 9, Fig. 3, rigidly attached at right angles thereto.

Journaled upon the stem 9 is a dial 10 with a pinion 11 cut at the extended end thereof, the dial being recessed as better shown in Fig. 4.

The upper end of the stem 9 is squared and carries rigidly attached thereto by means of the screw 12 a spring cover plate 13, which registers with the recessed portion of the dial 10. The cover plate has a circular slot 21, Fig. 5, cut therein extending about 300 degrees in order to give spring tension on the pin 14, so that it may register with the depressions 15, Figs. 4 and 5, in the dial 10.

Spaced annularly to correspond with the depressions 15 is a series of numbers adapted to correspond with records of various lengths, and the cover plate 13 is provided with an aperture 16, so that a number will be displayed when the pin 14 registers with the corresponding one of the depressions 15.

Coacting with the pinion 11 is a section of an internal gear 17, better shown in Fig. 2.

It is evident that by turning the dial 10,

the pinion 11 meshing with the sector 17, will slide the sector in the guide 18, which is rigidly attached to the arm 7, and the depressions 15 registering with the pin 14 will tend to prevent lateral movement of the sector 17. As the sector 17 is concentric with the axis of the post 6, and as this post approaches the latch during actuation of the machine, it is evident that the actuating end of the sector will always impinge on the latch 2 at the same point, and at a direction at 90 degrees with the surface of the contact. It is also evident that the time at which the brake actuating lever 2 will be operated by the movement of the post 6 will depend on the position of the sector 17, which in turn depends upon the setting of the dial 10. This attachment therefore provides means for shutting off the actuating mechanism at any desired point, and the preferred method of operation is to first play each record through and shut off by hand the brake lever 2 as soon as the record is completed. Then by turning the dial 10 so as to move the actuating end of the sector 17 up against the lever 2 in its shut-off position, determine the number shown on the dial and mark that particular record with this number so that whenever it is played again, the dial may be set to that number and the mechanism will be automatically shut off as soon as the record has been completed.

While I have described my invention and illustrated it in one particular design, I do not wish it understood that I limit myself to this construction, as the application of

my invention may be varied in many ways within the scope of the following claims.

Claims:

1. The combination in a phonograph of a rotating member, a brake member for co-operation with said rotating member, a latch, an actuating member adapted for automatic movement into engagement with said latch to actuate the same, a movable impinging member carried by said actuating member, a dial member controlling the position of said impinging member, and a spring cover plate for the dial having an aperture therein, and a detent pin to position said impinging member.

2. The combination in a phonograph of a rotating member, a brake member for co-operation with said rotating member, a latch, an actuating member adapted for automatic movement into engagement with said latch to actuate the same, a sector of an internal gear slidably mounted in said actuating member, so as to be movable therein along a circle of the same radius as said sector, a stem fixed in said actuating arm at right angles thereto, a dial member having an extended end carrying a pinion journaled on said stem, said pinion meshing with said sector, a spring cover plate fixed on said stem and covering the dial, except for an aperture in said cover plate, and a detent pin in said spring cover plate registering with depressions in said dial for locating said dial with respect to the aperture in said cover plate.

WILLIAM A. LUCKER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

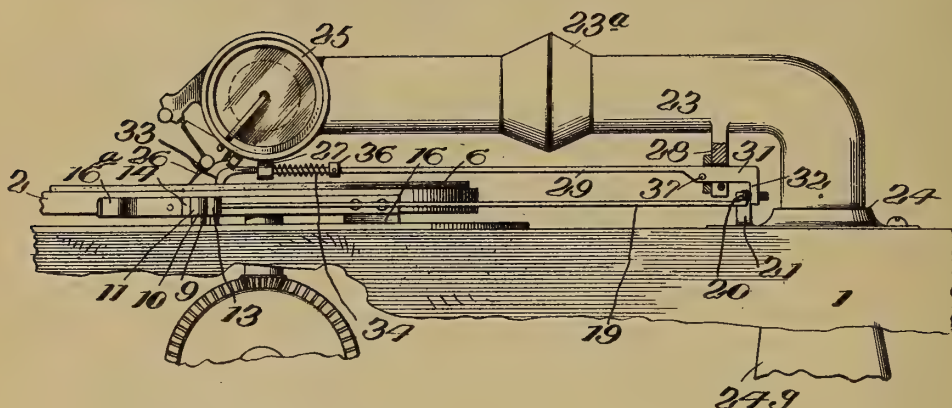
AUTOMATIC STOPPING DEVICE FOR SOUND
REPRODUCING MACHINES,

Reissue#14,257-----H. C. Miller,
(Reissued)--Patented-February 6th, 1917.
Filed-October 20th, 1915.

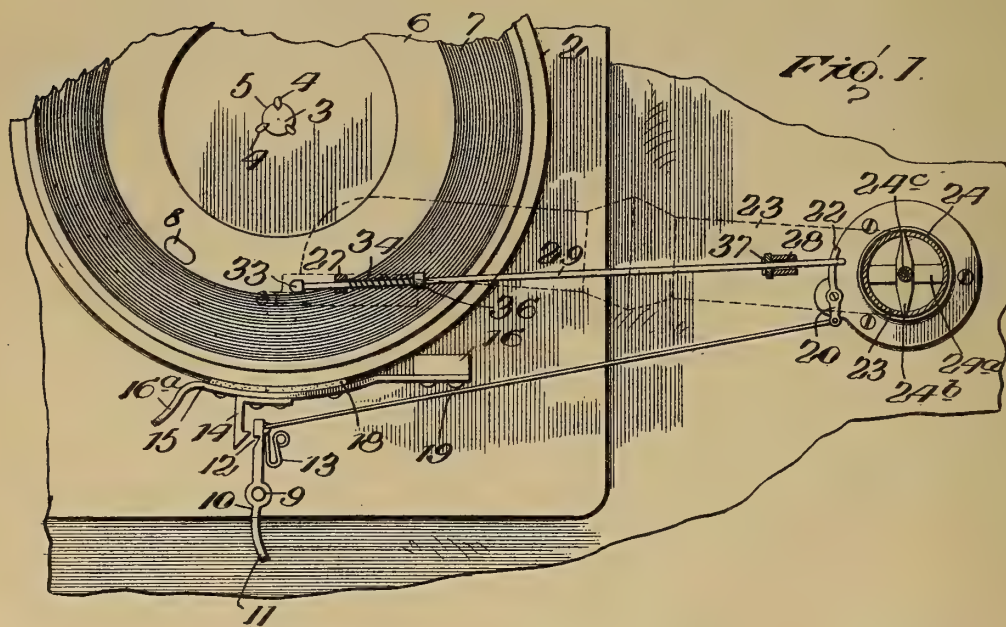
APPLICATION FILED OCT. 20, 1915.

2 SHEETS--SHEET 1.

Fig. 2.



Ficó. 1.

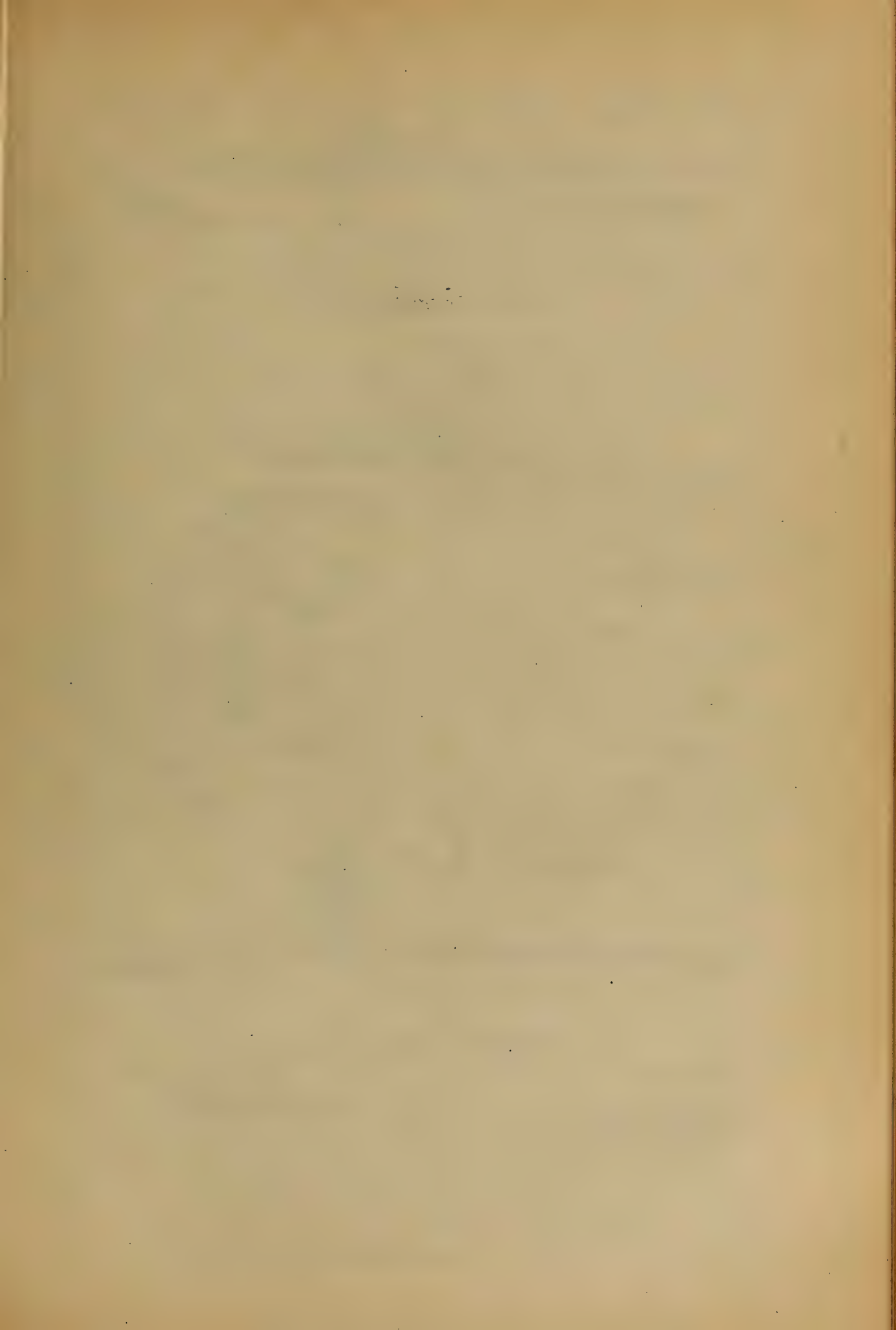


F. J. Hartman.
John D. Myers.

ॐ५

Frutos + Blount

Attorneys



H. C. MILLER.
 AUTOMATIC STOPPING DEVICE FOR SOUND REPRODUCING MACHINES.
 APPLICATION FILED OCT. 20, 1915.

Reissued Feb. 6, 1917.

14,257.
 2 SHEETS—SHEET 2.

Fig. 3.

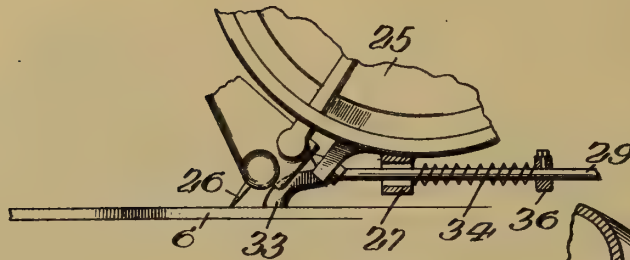


Fig. 4.

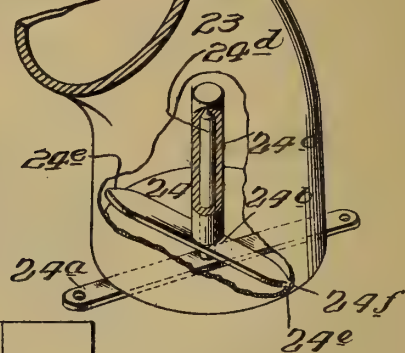
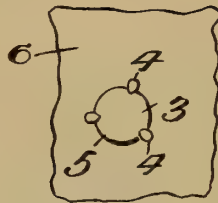


Fig. 7.

Fig. 5.

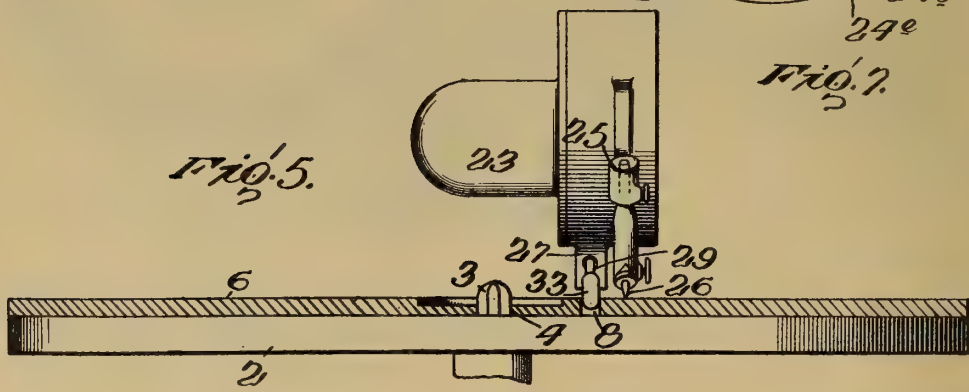


Fig. 6.



Inventor

Witnesses

W. F. Hartman.
 John D. Myers.

By

Henry C. Miller.
 Frutoy & Blount.

Attorneys

UNITED STATES PATENT OFFICE.

HENRY C. MILLER, OF WATERFORD, NEW YORK, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, OF CAMDEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

AUTOMATIC STOPPING DEVICE FOR SOUND-REPRODUCING MACHINES.

14,257.

Specification of Reissued Letters Patent. Reissued Feb. 6, 1917.

Original No. 1,076,385, dated October 21, 1913, Serial No. 321,014, filed June 9, 1906. Application for reissue filed October 20, 1915. Serial No. 57,003.

To all whom it may concern:

Be it known that I, HENRY C. MILLER, a citizen of the United States, residing at Waterford, in the county of Saratoga and State of New York, have invented certain new and useful Improvements in Automatic Stopping Devices for Sound-Reproducing Machines, of which the following is a specification.

This invention relates to an improved automatic stopping device for use in connection with talking machines.

According to my invention I provide means to actuate a brake device adapted to stop the rotation of a record-supporting device, at the termination of the operative travel of the sound box and its stylus over the grooves of the record, such brake-actuating means being brought into operation directly by the conjoint action of the record and the automatic movement thereover of the sound box and stylus and its tone-carrying arm.

To these ends my invention consists in its entirety of the combination with a brake device actuated by a spring mechanism which maintains it normally in contact with the periphery of a rotatable sound record support, as usual, of a movable catch device that may be set to tension the brake-spring and maintain the brake normally out of contact with the record, a pivoted latch provided with means to cause it to move into engagement with the catch element, connecting means pivoted at one of its terminals to said latch, and a lever hinged to the other end of said connecting means and operating to rock the latch on its pivot, and a member brought into operative relation to said lever on the completion of the operative movement of the tone arm carrying the sound box over the sound grooves of the record. My invention in the embodiment thereof illustrated in the drawings also includes specific means to actuate the hinged lever through the operative movement of the tone arm, said means comprising means on the record itself actuating a rod caused to contact with said hinged lever on the completion of the operative movement of the stylus relative to the sound record grooves; but the essential features of the brake-actuating mechanism, forming a novel sub-

combination of my invention, reside in the combined tripping means stated, irrespective of the specific means to operate the hinged lever on the completion of the operative movement of the tone arm and sound box over the record grooves.

In the drawings—

Figure 1 is a plan view of a portion of a talking machine, showing my improvement applied thereto.

Fig. 2 is a side elevation of the same.

Fig. 3 is an enlarged detail view of one of the tripping member.

Fig. 4 is an enlarged detail view of the means I employ for holding the record on the turn table.

Fig. 5 is an end elevation.

Fig. 6 is a detail view of a record having a lug, instead of an opening to operate the automatic stopping mechanism.

Fig. 7 is a detail view of a coupling I employ between the sound conveyer and the horn.

The same numerals refer to like parts in all the figures.

1, indicates a talking machine, of the disk type, but it is to be understood the invention is not limited to machines having this characteristic, as it will operate equally well in connection with cylinder records. The numeral 2 indicates a turntable provided with a central spindle 3, having preferably three splines to cooperate with notches 4, communicating with the centrally disposed opening 5, of a disk record 6. In the specific form shown in the drawings for actuating the brake-controlling mechanism, I can utilize the record, having the usual spiral and laterally-undulating sound grooves 7 as the sole initial actuating member for operating the brake-controlling device, and this is effected by providing a small opening 8 therein, adjacent the inner end of the sound grooves and preferably spaced therefrom, or its equivalent contacting lug 8^a on the face of the record in the same location.

9, represents a stud on the motor board of the talking machine, or may be a post on the frame of the motor, but as the motor has nothing to do with my present invention I have not deemed it necessary to illustrate or describe it. Mounted on the stud 9, is a

latch 10, having a finger operating end 11, and a notch 12, at the opposite end, a spring 13, normally exerting pressure against said latch to force the notched side into a catch 14. The catch 14, is mounted on a spring actuated brake member 15, secured to the frame of the machine at 16, and bent out at one end to form a finger grip 16^a. On one face of the member 15, is a leather shoe 18, adapted to bear on the periphery of the turntable 2 when the member 15 is released from the latch.

Connected to the notched end of the latch 10, is a rod 19, pivotally attached at its opposite end to a lever 20, mounted on a post 21, but it is to be understood that any other suitable operative connection between said latch and said lever may be employed. The free end 22, of the lever 20, extends somewhat beyond the post 21, to cooperate with the means for tripping the brake.

In the aforesaid specific form of tripping member shown in the drawings for actuating the brake-controlling mechanism, a rod 29 is employed, carried by the tone arm or sound box carrying arm 23, mounted to turn horizontally on a coupling, indicated at 24. On the outer end of the sound conveyer is attached the usual sound box 25, having a stylus 26. Two bearings 27, and 28, support the tripping member 29, which, as shown, extends longitudinally of the conveyer and has a slight lateral movement in its bearings toward and from the record disk, as well as a slight movement in direction of the record face, and longitudinal movement for operating the automatic brake. The tripping member therefore is mounted independent of the stylus, and does not interfere with the movement of the latter. The rear end 31, of the tripping member is enlarged to provide a substantial bearing, and is turned down to form a depending finger 32, which is located behind and in close proximity to the free end of the lever 20, but is not connected thereto. The front free end of the tripping member has attached to it a downwardly inclined or beveled rubber tip 33, adapted to cooperate with the opening 8, or a lug if one be employed. The tripping member is normally forced toward the rear of the machine by a spring 34, confined between the collar 36 thereon, and bearing 27, the movement of the tripping member toward the rear being limited by a stop 37.

To start the machine, the finger grip 16^a, of brake member 15, is drawn away from the periphery of turntable 2, which frees the motor. The catch 14, catches in the notch 12, and the spring brake member is held away from turntable 2. This permits the latch 10, to turn slightly which, through the connection 19, moves the free end 22 of lever 20, toward the depending finger 32, of the tripping member 29. As the stylus

follows the spiral groove in the record, the rubber tip likewise travels the same course, but in advance of the stylus. The rubber tip is supported on the record, but because of its being of resilient material it does not mar or destroy the groove. The tipped end of the tripping member being to one side of and spaced from the stylus it necessarily follows that it will leave the zone of the record groove first. This relationship of parts is preferable to enable me to locate the opening 8 some distance from the end of said record groove.

When the stylus reaches the end of the sound record groove, the tipped end 33, of the tripping member 29, drops into opening 8, and is drawn forwardly thereby. The finger 32, engaging lever 20, rocks it, and through connection 19, the notch 12, is disengaged from the catch 14, and the spring brake member 15, springs toward the turntable and stops the motor. When the rear edge of opening 8, engages the tipped end 33, and pulls it forward, spring 34, is compressed, but the parts are so arranged that before the shoe 18, finally brings the motor to a standstill, the pull on the beveled end of the tip will cause the latter to rebound or become disengaged, and the spring 34 will return it to normal position. The spring 34, therefore tends to act as a retarder, as it causes a pull on the motor, before the shoe finally stops the machine. Furthermore, by the particular construction and arrangement of parts the motor is stopped without jarring the mechanism as would be the case if the tripping member were held fast when the brake shoe is applied.

By the use of this invention it is not necessary for an operator to be positioned adjacent a machine, as the attachment will automatically stop the motor, after the selection has been produced. To restore the stylus to its normal position, or for the insertion of another record, the sound conveyer is raised in the usual manner and turned toward the right, as will be understood.

The sound conveyer 23, is formed intermediate the sound box, and the coupling 24, with a truncated enlargement 23^a, as shown in Fig. 1, to augment the sound. The coupling 24, comprises a support 24^a, secured at its ends to a fixed part of the machine, and a conveyer support 24^b, has a centrally disposed bearing 24^c, to receive a post 24^d, on support 24^a, and laterally disposed journals 24^e, having bearings at 24^f, in the sides of the sound conveyer. By this construction the sound conveyer is coupled to a horn 24^g, and may be raised or lowered, or turned horizontally over the record.

What I claim is:—

1. In a talking machine comprising a ro- 130

tatable record support, a spring-actuated brake adapted to engage the record support, a sound box having a stylus, a sound box carrying-arm having movement over the record, and a record having sound grooves adapted to automatically propel the stylus over the same by contact, the combination therewith of a movable catch device adapted to be set to tension the brake-spring and maintain the brake normally out of contact with the record, a pivoted latch provided with means to cause it to move into engagement with the catch element, connecting means pivoted at one of its terminals to said latch, a lever hinged to the other end of said connecting means and operating to rock the latch on its pivot, and a member brought into operative relation to said lever on the completion of the operative movement of the arm carrying the sound box over the sound grooves of the record.

2. In a sound reproducing machine, the combination with a rotatable record support, a brake therefor, a record provided with trip operating means, a movable tripping member adapted to be operated by the operating means on the record, means between the tripping member and the brake for releasing the latter, and automatic means for returning the tripping member to normal position after the brake has been released.

3. In a sound reproducing machine, the combination with a rotatable record support, a spirally grooved record, a sound box and stylus adapted to be automatically propelled across the same by said grooves, and sound box supporting means adapted to have a free swinging movement over the record, of a spring-controlled brake device, a catch device adapted to be set to counteract the brake spring, a pivoted latch, a rocking lever, connecting means between said latch and lever, and a tripping member adapted to be brought into operative relation to said lever.

4. In a sound reproducing machine, the combination of a sound box, a rotatable record support, a brake to stop the record support at a predetermined point in its movement, a tripping member movable with the sound box, means for operating the tripping member, and means between the tripping member and the brake for operating the latter, said means being separated from but in the path of movement of the tripping member.

5. In a sound reproducing machine, the combination of a rotatable record support, a brake therefor, a record having a trip-engaging part, a tripping member cooperating therewith, a lever adapted to be engaged by the tripping member, a catch device operating normally to hold the brake in inoperative position, a pivoted spring actuated latch, and connecting means between said lever and the latch.

6. In a sound reproducing machine, the combination of a sound box, a record support, and brake mechanism for stopping the movement of the record support at a determinate point, said brake mechanism comprising a tripping member mounted to move with the sound box, a brake having a catch, a pivoted latch, a pivoted lever with which the tripping member cooperates, and a connection between the pivoted lever and the latch.

7. The combination with a sound reproducing machine, of a cut-off comprising brake mechanism, means for releasing the same which in part moves with the reproducer of the machine, mechanical means mounted to move with the rotatable record support of the machine for operating directly on said releasing means, and means for automatically returning to normal position the part of the releasing means movable with the reproducer.

8. The combination with a sound reproducing machine comprising a movable supporting arm, and a sound box carried thereby, and a rotatable record support, of a cut-off therefor comprising a brake, means for normally holding the brake in operative position, a catch device and a cooperating latch for holding the brake in inoperative position, tripping means for the latch mounted to move with the sound box and with the movable arm supporting the same, and means brought into operative position by the rotation of the record, for engaging the tripping means to actuate it and release the latch.

9. A talking machine comprising a rotating record support, a reproducer movable relatively thereto, a brake for said support, means for normally holding said brake in braking position, a latch for holding said brake in inoperative position, tripping means for the latch mounted to move with the reproducer, and means carried by the rotating record support for engaging the tripping means to move said tripping means and thereby release the latch.

10. The combination with a talking machine including a movable arm and a record formed with a depression, of a trip mechanism movably carried by the movable arm of the machine and including a body designed to engage the depression in the record, a rod actuated in the movement of the body under the influence of the record, and a brake mechanism automatically actuated by said rod.

11. In a talking machine, the combination with a movable record, a sound reproducing device adapted to move over said record, a stop for controlling the movement of said record, and a stop-controlling mem-

ber, of positively actuated means permanently connected to said stop-controlling member and controlled by the movement of said sound-reproducing device for actuating said stop-controlling member.

12. In a talking machine, the combination with a movable record, a sound-reproducing device adapted to move over said record, a stop for controlling the movement of said record, and a stop-controlling member, of means for positively actuating said stop-controlling member, mechanism for operating said actuating means, and means connected to said sound-reproducing device for controlling said operating means.

13. In a talking machine, the combination with a movable record, a sound-reproducing device adapted to move over said record, a stop for controlling the movement of said record, and a stop-controlling member, of a movable bar operatively connected to said stop-controlling member and adapted to be actuated simultaneously with said sound-reproducing device as the latter moves toward the end of the record, and means controlled by the movement of said sound-reproducing device for controlling the movement of said bar.

14. In a talking machine, the combination with a movable record, an arm movably supported above said record, a sound-reproducing device carried by said arm and adapted to move over said record, a stop for controlling the movement of said record, and a stop-controlling member, of means movably mounted on a fixed part of said machine for automatically actuating said stop-controlling member, and a finger carried by said arm for controlling the movement of said actuating member.

15. In a talking machine the combination with a rotatable record support, a sound record, a sound box, and means to move the sound box across the record, of a device operative to stop the rotation of said record support, a latch for holding said device inoperative, a lever movably connected to said latch and adapted to release the same, and means for automatically actuating said lever when the sound box reaches a predetermined point on the record.

16. In a talking machine, the combination with a movable record support, and a sound box arranged to traverse a record thereon, of a brake, means for applying said brake to said record support, a latch for holding said brake in inoperative position, mechanical means having a jointed connection with the latch and adapted to release the same, and means movable with the sound box for actuating the last-named means when the sound box reaches the end of the record.

17. In a talking machine, the combination with a record support and a sound box adapted to traverse the same, of a brake

adapted to engage the record support, two pivoted members operatively connected together at all times and one of which is adapted to engage the brake and forms a latch therefor to hold the same in inoperative position, and means movable with the sound box for engaging the other member to release the brake when the sound box reaches a predetermined point on the record.

18. In a talking machine, the combination with a record support, a movable sound box arm and a sound box carried thereby, of a brake adapted to engage the record support, two pivoted members operatively connected together at all times and one of which is adapted to engage the brake and forms a latch therefor to hold the same in inoperative position, and a finger carried by said sound box arm and adapted to engage said other member to release the brake when the sound box reaches a predetermined point on the record.

19. In a talking machine, including a rotatable record support, and a tone arm mounted to carry a sound box over and in operative relation to the record, the combination therewith of a brake device to stop the movement of the record support, comprising a tripping member mounted to move in accord with the movement of the sound box, a brake, a pivoted latch for holding the brake in inoperative position, and a lever movably connected to the latch and cooperating with the tripping member to release the brake when the sound box reaches a predetermined point on the record.

20. In a talking machine, the combination with a movable sound record support and a sound box arm movable across the same, of brake mechanism for stopping the movement of the record support at a determinate point, said brake mechanism comprising a brake, a catch and coacting pivoted latch for holding the brake in inoperative position, a lever movably connected to the latch and adapted to release the same, and tripping means intermediate said lever and said sound box arm for releasing the latch when the sound box reaches the end of the record.

21. In a talking machine, the combination with a sound box and a record support, of brake mechanism for stopping the movement of the record support at a determinate point, said brake mechanism comprising a brake having a catch, a pivoted latch adapted to engage said catch, a lever movably connected to the latch and adapted to release the same, and means for automatically actuating the lever when the sound box reaches a predetermined point on the record, to move the latch and release the brake.

22. In a talking machine, the combination with a movable sound box arm, a sound box and a record support, of brake mechanism for stopping the movement of the record

support at a determinate point, said brake
mechanism comprising a brake having a
catch, a pivoted latch adapted to engage
said catch, a lever movably connected to said
5 latch and adapted to release the same, and
a finger movable with said sound box arm
and adapted to engage said lever when the

sound box reaches a predetermined point on
the record, to move said latch and release
the brake.

In testimony whereof I have signed my
name to this specification.

10

HENRY C. MILLER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

SELF RELEASING LID SUPPORT,
#1,214,890-----G.H. *Bowen*, Jr.,
Patented-February 6th, 1917.
Filed-March 24th, 1915.

G. H. BOWEN, JR.
 SELF RELEASING LID SUPPORT.
 APPLICATION FILED MAR. 24, 1915.

1,214,890.

Patented Feb. 6, 1917.

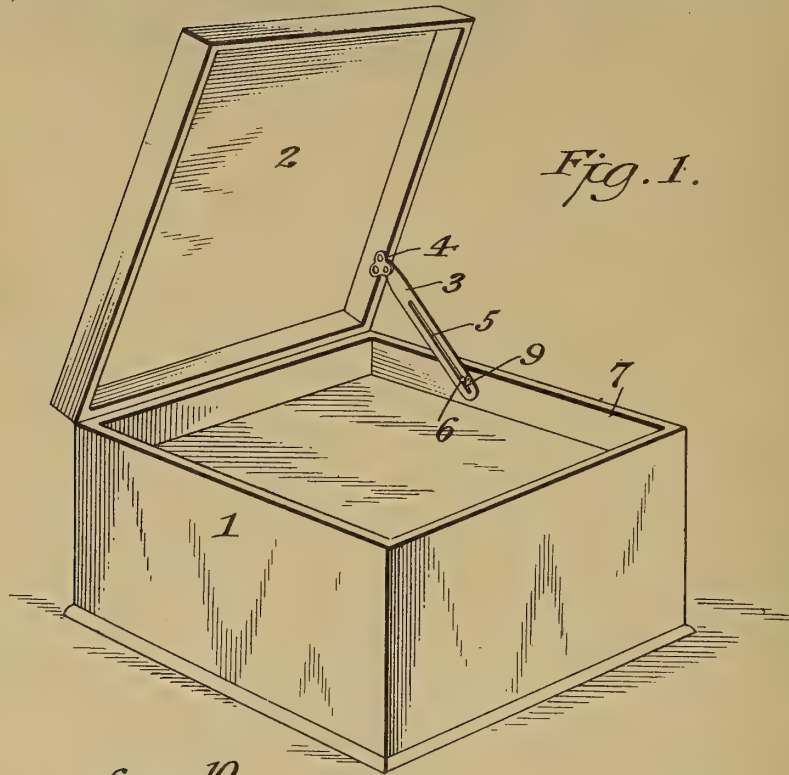


Fig. 1.

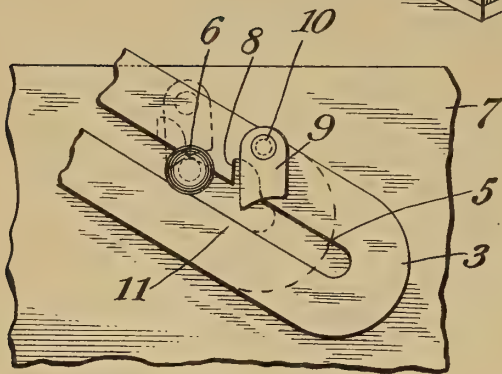


Fig. 2.

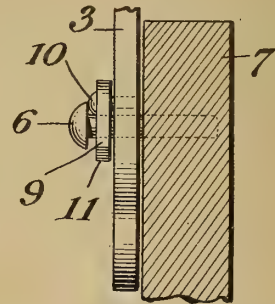


Fig. 3.

Inventor

George H. Bowen, Jr.

By his Attorneys

Mauro, Cameron, Lewis & Kassie

UNITED STATES PATENT OFFICE.

GEORGE HENRY BOWEN, JR., OF TORONTO, ONTARIO, CANADA, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

SELF-RELEASING LID-SUPPORT.

1,214,890.

Specification of Letters Patent.

Patented Feb. 6, 1917.

Application filed March 24, 1915. Serial No. 16,817.

To all whom it may concern:

Be it known that I, GEORGE HENRY BOWEN, Jr., a citizen of the Dominion of Canada, and a resident of Toronto, Ontario, Canada, (whose post-office address is 406 Parliament street, Toronto, Ontario, Canada,) have invented a new and useful Improvement in Self-Releasing Lid-Supports, which invention is fully set forth in the following specification.

This invention relates to automatically-releasing lid-supports for boxes or the like. The object of the invention is to provide an improved device of this character, by which upon merely raising the lid or cover of the box or the like, the same will be automatically held in its raised position; and, thereafter, the lid can be lowered (as by one hand) by merely raising the lid a trifle higher and thereby automatically releasing the catch so that the lid can be lowered freely.

Broadly stated, the invention consists of providing in the usual rigid bar (constituting the lid-prop) a longitudinal slot having a seat adapted to engage a stationary support carried by the box, and mounting upon said bar, adjacent said seat, a pivoted dog which permits the engagement of said seat and support when the lid is opened, but prevents engagement of said parts while the lid is being lowered. The invention consists further in the features of construction and arrangement hereinafter set forth and claimed. Although the invention is susceptible of embodiment in various forms, it will be best understood in connection with the following detailed description and the accompanying drawings, which set forth one preferred embodiment.

In the drawings Figure 1 is a perspective of a conventional box or cabinet equipped with the preferred form of the present invention;

Fig. 2 is an elevation, on a much larger scale, of a detail showing in full lines the position of the parts before engagement

between the seat and the support, and in dotted lines the position preliminary to lowering the lid; and

Fig. 3 is an end view of Fig. 2.

In these drawings 1 represents a box, cabinet, trunk, or the like; and 2 the lid or cover or top hinged thereto. 3 is a rigid bar, constituting the lid-support; it is pivoted at its upper end to the lid, as at 4, and has the elongated longitudinal slot 5 in its lower portion. 6 is a headed stud, located in slot 5, and secured rigidly on the inner face of one of the sides of the box, as 7, near the top thereof, to constitute a support. At a suitable point, preferably near the lower end of the slot, is a reëntrant recess 8, to constitute the support-receiving seat. A dog 9 is pivoted upon bar 3, at a point 10, so as to hang down in such position as practically to cover the recess 8. The lower end of the dog is slightly concaved, and the corner 11 (on the side toward the pivoted end of the bar) is somewhat prolonged, so as to project beyond the seat 8 and into the slot 5.

As the lid 2 is raised, the seat 8 comes opposite the support 6, and will readily engage the same upon the very slightest lowering of the lid,—whereupon the lid is held securely propped open. In order to close the lid, the latter is first raised a slight distance farther, sufficient to carry the pivoted dog 9 up past support 6, and then lowered. At that moment, the relative position of the dog 9 and seat 8 (just before this lowering) is indicated in dotted lines in Fig. 2. It will be seen that, upon thus lowering the lid, the recessed lower edge of the dog and its nose 11 will engage upon the stud 6 and the dog will be swung partly around (toward the left) until the stud has passed into the upper portion of the slot, thus preventing the stud from entering the seat, and thereby permitting the lid to be lowered freely the entire distance so as to close the box.

The invention has been thus described in detail, yet only for the sake of clearness

since the invention is not limited to the precise construction and arrangement set forth, but may be embodied in a variety of forms.

Having thus described the invention,
5 what is claimed is:

An automatically - releasing lid - support for boxes or the like, consisting of a slotted prop swinging from the lid and having a seat communicating with said slot, a support
10 carried by the box and engaged by said

slot, and a dog pivoted upon said prop adjacent said seat and protruding over said slot.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

GEORGE HENRY BOWEN, JR.

Witnesses:

JESSIE C. WEBSTER,
J. P. REGAN.

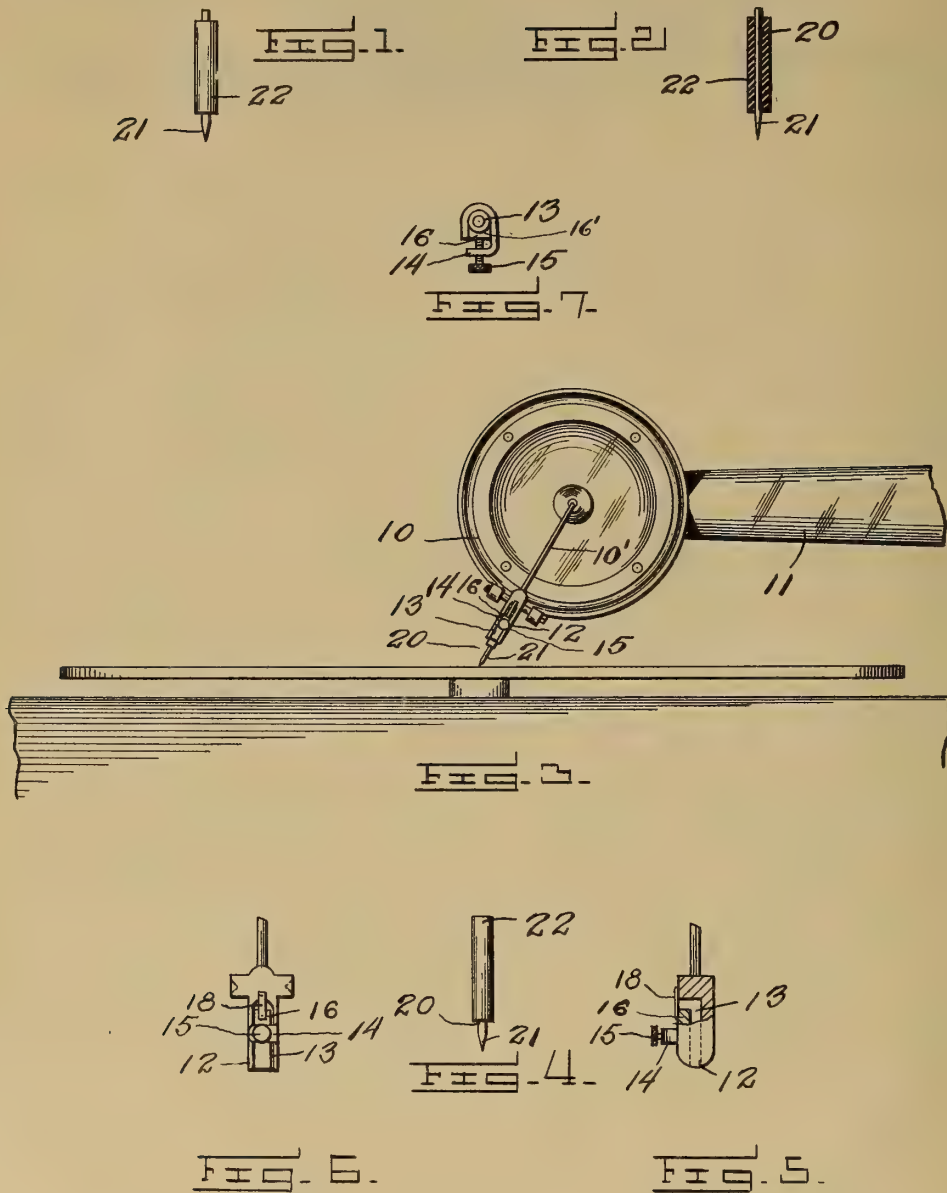
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

NEEDLE ATTACHMENT,
#1,215,328-----P. H. Adams.
Patented-February 13th, 1917.
Filed-January 27th, 1915.

P. H. ADAMS.
NEEDLE ATTACHMENT.
APPLICATION FILED JAN. 27, 1915.

1,215,328.

Patented Feb. 13, 1917.



Witnesses
Chas. Nielsen, Jr.,
O. N. Woodruff

Inventor
Porter H. Adams,
By *H. Woodward*
Attorney

UNITED STATES PATENT OFFICE.

PORTER H. ADAMS, OF BROOKLINE, MASSACHUSETTS.

NEEDLE ATTACHMENT.

1,215,328.

Specification of Letters Patent.

Patented Feb. 13, 1917.

Application filed January 27, 1915. Serial No. 4,716.

To all whom it may concern:

Be it known that I, PORTER H. ADAMS, a citizen of the United States, residing at Brookline, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Needle Attachments, of which the following is a specification.

The invention has for an object to give a simple means for eliminating the "scratch" or grating sound noticeable in the reproduction of phonographic records.

Additional objects, advantages and features of invention will appear from the construction arrangement and combination of parts hereinafter set forth and shown in the drawings, in which—

Figure 1 is an elevation of a needle constituting one form of my invention,

Fig. 2 is a longitudinal sectional view thereof,

Fig. 3 is an elevation of a holder and needle engaged therein.

Fig. 4 is a detail of a modification of the needle.

Fig. 5 is a detail side view of the needle holder,

Fig. 6 is a detail front view thereof,

Fig. 7 is a detail end view of the needle holder.

There is illustrated a sound box 10, carried by the sound arm 11 in a familiar manner, a stylus bar 10' being mounted on the box having a needle holder at the lower end. The sound box construction including the stylus and its mounting are of any usual construction, and need not be modified. I have, however, shown a form of holder especial useful in connection with my form of needle, and which I believe will embody principles practically essential in the use of a needle of this kind, the holder being rigidly secured in the usual position on the stylus bar, or formed integrally therewith. The holder in the present case is formed with a needle receiving socket of larger diameter than the ordinary, and comprises a stationary jaw portion 12 the shank of which forms a continuation of the stylus bar. This jaw is formed with a longitudinal channel 13 having a rounded bottom, and open on one side of the jaw, a bridge 14 being formed thereover intermediately of its length, in which there is engaged a binding screw 15 bearing against a clamping plate 16 movable toward and away from the

bottom of the channel 13 and having a longitudinal transversely curved groove 16' on its inner side opposed to the bottom of the channel. This plate is supported by a spring 18, which tends to hold the plate at the outer limit of its movement yieldably to the pressure of the screw. The spring is engaged upon the back of the plate and fixed to the base of the jaw 12 and may be also fixed on the plate 16.

Engaged in the holder there is a needle 20, comprising a steel point piece 21, somewhat longer than the ordinary needle customarily employed in disk record machines at present, and it is provided with a rubber jacket 22, completely encircling the needle point body throughout the major part of its length, stopping short of both ends, the point proper of the piece 21 being well projected therefrom. In practice the needle is about $\frac{1}{16}$ (one sixteenth) of an inch in diameter from its inner ends to the outer end of the jacket, and in the neighborhood of one inch in length, the point proper projecting about three sixteenths of an inch from the jacket. This point may be of the usual taper and sharpness. The jacket is of a uniform thickness throughout its length and is approximately $\frac{1}{16}$ (one sixteenth) of an inch thick. The needle with its jacket is presented in the holder while the screw 15 is at the outer limit of its movement and the screw then operated to press the plate 16 firmly against the jacket of the needle, by which means it is held securely in place.

I have found it desirable to form the needle and jacket substantially of the length shown, although it may be found possible or desirable to vary these proportions. The quality of the jacket has a determining effect, as with a very soft rubber for instance, it would be desirable to have a long jacket; on the other hand, a jacket may be used having a reduced resilience which would not require to be quite so long. For small rooms it is thought desirable to use a soft rubber jacket, while for large halls it may be that a harder jacket would be desirable, although the efficiency of the needle with a soft jacket is such that it will give a strong reproduction of a record. In practice the resilience of the jacket has approximated that of the tread rubber of motor tires.

In one use of the device, the projecting blunt end of the needle is allowed to engage against the inner end of the holder, in an-

other, the inner end of the needle is entirely covered by the jacket, as in Fig. 4, whereby the needle is entirely isolated from metallic connection with the diaphragm.

- 5 The needle with its inner end exposed may also be adjusted with its inner end out of contact with the holder when clamped, if desired. The attainment of entire insulation of the sound box, diaphragm and connections between the needle and diaphragm from the transmission of those jars or vibrations which are beyond the range of harmonic sound is thus attained, and in practice the device has been found to give a highly satisfactory rendition of the record proper. At the same time the prior difficulties in providing simple and practicable mountings and connections under this condition have been eliminated. As before stated, the ordinary mounting for the needle holder may be employed, without cushioning, and the connections between the holder and diaphragm may be of any familiar form, also requiring no cushioning.
- 25 Some of the simpler mountings and connections of the earlier stages of the art are available for use with my invention, with the best results, and a great cheapening of the cost.
- 30 It is possible to modify the embodiment of my invention, and to use it in other ways than specifically indicated herein, as will be understood.

My needle with the insulating jacket may be inserted in the ordinary needle holder

and held by the usual set screw there provided, but with the character of jacket required to produce the effect desired, such screw tends to pass through the jacket and engage the needle directly, thus completing a metallic connection from the needle to the stylus bar and defeating the purpose of the invention. Therefore, the invention appears to necessarily involve a holding appliance in which a large area of the jacket is compressed to secure the needle in the holder, in practice the needle having been made in excess of one inch in length, and the jacket about one inch in length.

What is claimed:

A reproducing device for machines of the kind indicated including a stylus bar, a needle holder rigidly carried thereby, comprising a body having a longitudinal channel opening on its outer end, an elongated clamping plate alined with the channel and movable to engage a needle interposed in the channel, a leaf spring attached to the body and to the plate, shaped to hold the plate yieldably at the outer limit of its movement, an extension of the body disposed over the channel and a screw engaged therethrough impinging upon the plate.

In testimony whereof I have affixed my signature in presence of two witnesses.

PORTER H. ADAMS.

Witnesses:

SEWALL C. BROCKETT,
FRANK S. DELAND.

PHONOGRAPH,
#1,215,410-----C.B.Repp,
Patented-February 13th, 1917.
Filed-October 29th, 1912.

C. B. REPP.
PHONOGRAPH.

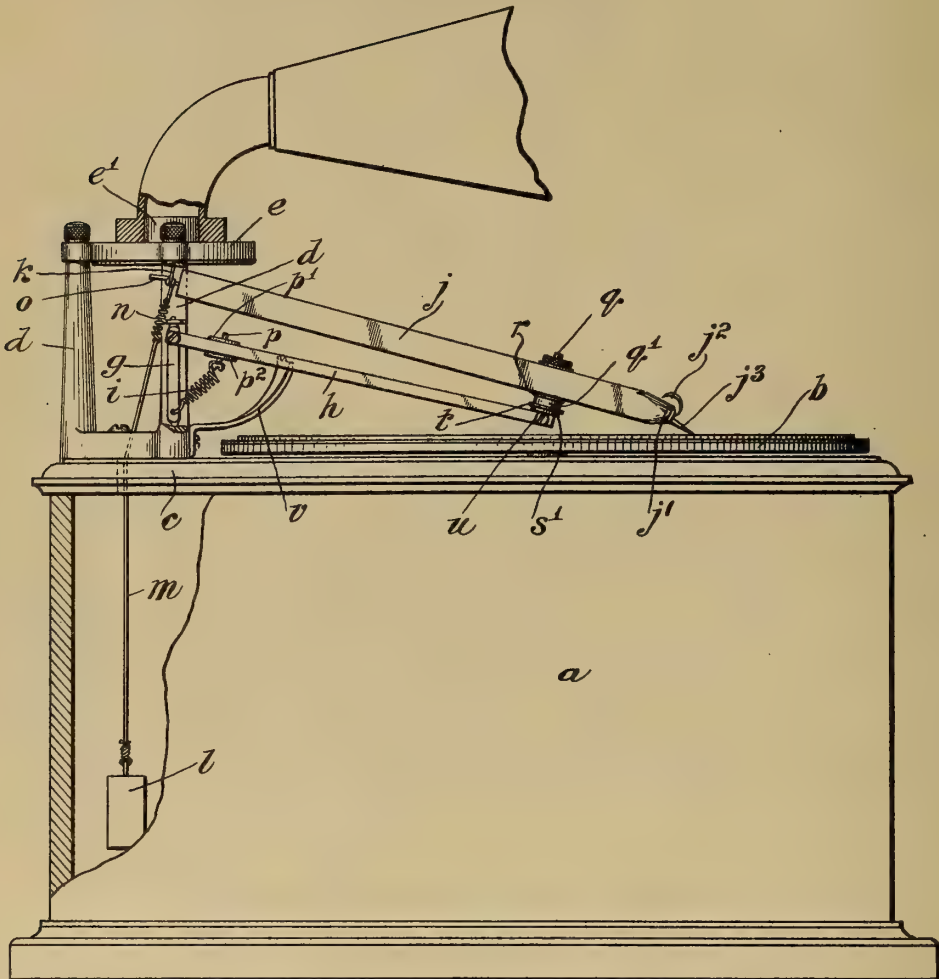
APPLICATION FILED OCT. 29, 1912.

1,215,410.

Patented Feb. 13, 1917.

2 SHEETS—SHEET 1.

Fig. 1.



Attest:
E. D. Mitchell
Eugene W. Waring

Clinton B. Repp Inventor:
by *Frank J. Whitworth*
his Atty.



1,215,410.

Patented Feb. 13, 1917.
 2 SHEETS—SHEET 2.

Fig. 2.

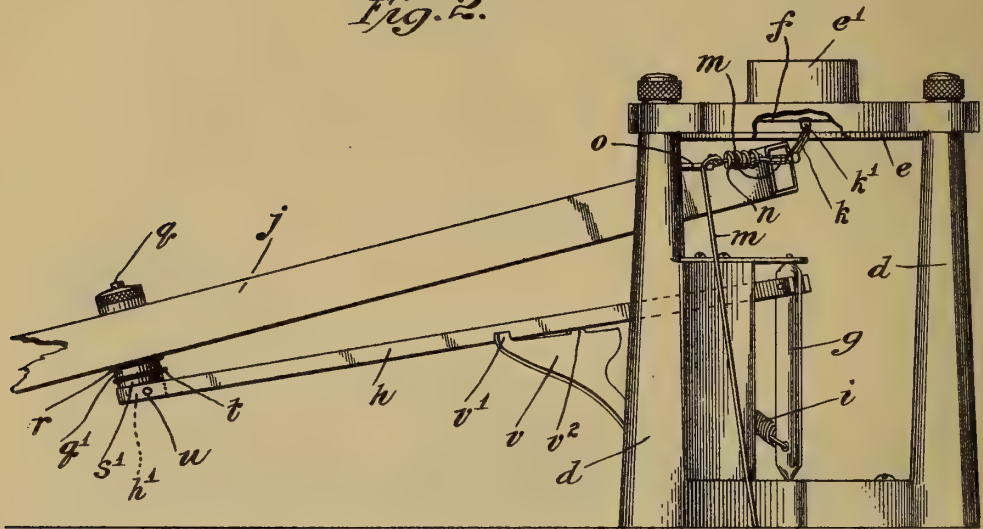


Fig. 3.

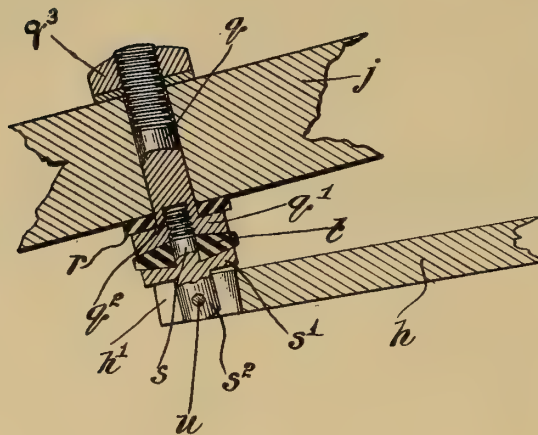


Fig. 4.



Attest:
E. M. T. C.
 Eugene M. T. C.

Clinton B. Repp Inventor:
 by *Frank P. Wentworth*
 his Atty

UNITED STATES PATENT OFFICE.

CLINTON B. REPP, OF PLAINFIELD, NEW JERSEY.

PHONOGRAPH.

1,215,410.

Specification of Letters Patent.

Patented Feb. 13, 1917.

Application filed October 29, 1912. Serial No. 728,435.

To all whom it may concern:

Be it known that I, CLINTON B. REPP, a citizen of the United States, residing at Plainfield, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a specification, reference being had therein to the accompanying drawings, which form a part thereof.

My invention relates to phonographs, and more particularly to a type of phonograph wherein sound vibrations pass to the diaphragm through a transmitter or vibrator arm, and wherein the diaphragm is subjected to tensioning stresses.

The main object of the invention is to provide a phonograph of this character wherein the diaphragm will be subjected to a constant, uniform and definitely determinable stress which will not vary with the continued operation of the machine or be affected by the vibrations or rapid flexures of the diaphragm. A further object is to provide a phonograph of this type wherein the constant stress exerted upon the diaphragm will offer no impediments to the flexure of the diaphragm, and more particularly to that flexure of the diaphragm resulting from the transmission of high frequency, short length vibrations or impulses. A still further object is to provide a phonograph in which the direction of the application of the stress to the diaphragm may be varied to adapt the machine for use with either vertical cut or graphophone or lateral cut or gramophone records, wherein the adjustment of the tensioning means may be quickly accomplished without varying the stress on the diaphragm in a substantial degree. A still further object is to provide a phonograph in which the transmitter or vibrator arm has at one end thereof a mount for the reproducing stylus or point, and at the other end thereof a connection with the diaphragm, and is supported adjacent to said mount by a rigid pivotal arm, wherein said transmitter or vibrator arm is connected to said rigid or supporting arm by means which will insulate said transmitter or vibrator arm from said supporting arm to prevent the development of vibrations in said supporting arm and the parts appurtenant thereto. A still further object is to provide a phonograph such as is immediately above referred to, wherein the connect-

ing means between the transmitter or vibrator arm and the rigid supporting arm will be so constructed and arranged as to permit a universal movement of the transmitter or vibrator arm to facilitate the adjustment of the instrument for use with either graphophone or gramophone records. A still further object is to provide a phonograph of this character with a mount for the reproducing stylus or point, which will securely hold the reproducing stylus or point whether the machine be used in connection with a gramophone or a graphophone record, without likelihood of a loosening of the retaining means with a resultant loosening of the reproducing stylus or point, and likelihood of blasts or loss in volume in the sound reproduction. A still further object is to provide a machine of this character in which the supporting arm is acted upon by a spring in a manner to force said arm downwardly and with it the transmitter or vibrator arm in a manner to cause the requisite pressure of the reproducer stylus or point upon the record, wherein conveniently accessible means are provided for regulating the tension of this spring in a manner to avoid any possibility of an accidental variance in the tension of this spring. And a still further object is to provide a machine of this character which may be conveniently assembled, and which when once assembled cannot be readily disarranged or put out of order by the unskilled user.

The invention consists primarily in a phonograph embodying therein a sound box, a diaphragm mounted therein, a transmitter or vibrator arm, a supporting arm therefor, means connecting said transmitter or vibrator arm and said supporting arm, means whereby a reproducing stylus or point may be supported at one end of said transmitter or vibrator arm, a connection between the other end of said arm and said diaphragm, a tensioning member and a flexible, non-resonant strand connecting said tensioning member and said transmitter or vibrator arm adjacent to said diaphragm, whereby said diaphragm is subjected to a continuous, uniform and definitely determinable stress to tension it in a direction opposite to that in which the sound vibrations are passing from said arm to said diaphragm; and in such other novel features of construction and combination of parts as are hereinafter set forth and described, and more par-

ticularly pointed out in the claims hereto appended.

Referring to the drawings:—

Figure 1 is a side elevation of an instrument embodying my invention;

Fig. 2 is a rear elevation thereof;

Fig. 3 is an enlarged detail view of the universal connection between the supporting arm and the transmitter or vibrator arm; and

Fig. 4 is an enlarged view of the reproducing stylus or point mount.

Like letters refer to like parts throughout the several views.

In the embodiment of my invention shown in the drawings, *a* indicates a cabinet adapted to contain the motor and other parts for actuating a rotary table *b*, adapted to have a disk record mounted thereon, and *c* indicates the top slab of said cabinet.

Spaced away from, and to one side of, the axis of the table *b* are standards *d* supporting a sound box *e* having a sound outlet opening *e'* adapted to be connected to an amplifier.

Mounted within the sound box in any desired manner is a diaphragm *f* of the usual or any desirable material. Below and in axial alinement with the axis of the diaphragm *f* is a frame *g* moving about a vertical axis and mounted upon said frame by means of horizontal pivots is a rigid supporting arm *h*. Acting upon said arm in a manner to force it downwardly or toward the table *b* is a coil spring *i* or other means for developing pressure through said supporting arm.

Supported by said arm *h* is a transmitter or vibrator arm *j* which is connected adjacent to one end thereof to said supporting arm by means of a universally movable coupling which will be more fully described hereinafter. The said arm *j* is preferably composed of wood to enhance the tone qualities of the reproduced sound waves, and one end thereof is adapted to support a reproducing stylus or point in a manner to cause it to engage the record while the other end thereof is connected to the diaphragm by means of the flexible loop *k* and the stud *k'* carried by the diaphragm *f*, means being utilized for applying a tensioning stress upon said diaphragm through said flexible connection *k* and stud *k'*.

The construction heretofore described, considered broadly, has been made the subject matter of an application for Letters Patent heretofore filed by me, and it is not therefore my intention to broadly claim these features at this time.

In my aforesaid pending application, I also provide means for varying the direction of the application of the tensioning stress to the diaphragm, the universal connection to which I have heretofore referred, between

the supporting arm and the transmitter or vibrator arm being designed to permit that movement of the transmitter or vibrator arm relative to the supporting arm incidental to the changing of the position of the end of the transmitter or vibrator arm adjacent to the diaphragm in varying the direction of the application of pressure above referred to.

Heretofore in applying the tensioning stress to the diaphragm, I have used a coil spring, one end of which was attached to the transmitter or vibrator arm *j* adjacent to the flexible connection *k* and the other end of which was attached to a rigid metallic part of the machine. I have always found that this spring arrangement gives highly satisfactory results, so long as the desired tension is maintained in the spring. In practice, however, this spring has two disadvantages: first, owing to the high frequency of the vibrations of the diaphragm, and of this spring, with continued use the spring is apt to lose its resiliency and thus lessen the tension upon the diaphragm; and secondly, this spring being in tension, there is likelihood of a portion of the vibrations being transmitted thereto, although I have not found this of any material importance in the practice of my invention. In fact, with one skilled in the use of this machine, a spring the tension of which may be regulated would prove highly satisfactory, but with the unskilled, it is desirable to provide a tensioning means exerting a fixed, determinable stress upon the diaphragm not subject to variation by reason of continued use.

Means such as I have just referred to are also desirable as facilitating the adjustment of the machine in the factory.

To meet the foregoing conditions, I provide the weight *l* located within the cabinet *a* and connect this weight with the end of the transmitter or vibrator arm adjacent to the diaphragm, preferably by means of a flexible cord which has the advantage of tending to prevent vibrations passing from said transmitter or vibrator arm there-through.

With some types of records, I have found this cord alone to act satisfactorily, but with other records I have secured better results by arranging in the length of this cord a short length coil spring *n*. This spring does not in any way affect the stress exerted by the weight *l*, but it is sufficiently sensitive to permit minute vibrations of the diaphragm without any displacement of the said weight. Hence this spring will have the effect of making the diaphragm more sensitive.

When it is desired to adapt the machine for both vertical cut or graphophone, and lateral cut or gramophone records, I pro-

vide one of the standards d with a hook o adapted to receive the connecting means m between the weight l and the arm j . By this means the direction of the application of the stress to the diaphragm may be varied by merely raising the weight and throwing the cord across the hook o , which is a simple manner of accomplishing this adjustment and one which may be readily understood by the unskilled public user. The cord m passes through a protected opening in the slab c .

One end of the spring i is secured to the frame g and the other end thereof is attached to the arm h by means of a screw threaded spindle p passing through said arm and the nuts p' p^2 mounted upon said spindle upon opposite sides of said arm. By this means the tension of the spring i may be varied and the nuts p' p^2 so set as to prevent any likelihood of such movement of the spindle p as would accidentally vary the tension of this spring.

Having a close driving fit with an opening extending through the arm j , is a screw threaded stem q carrying an enlarged plate q' . Between the plate q' and the arm j is a resilient gasket r which is clamped tightly between the said plate and said arm by means of the nut q^3 bearing upon the top of said arm. The said stem q is provided with an interiorly screw threaded socket q^2 which coöperates with the stem s of a fitting having a flanged portion s' parallel with and oppositely disposed to the plate q' carried by the stem q .

The plate q' and flanged portion s' are concaved as shown in Fig. 3, and seated between the oppositely disposed faces thereof is a resilient gasket t . The screw threaded connection between the stems q s permits the desired regulation of the compression of the said gasket by the edges of the plate q' and flange s' , thus forming a highly effective insulation.

Extending below the flange s' is a stud s^2 which is connected to the arm h by means of the pivot screw u extending at right angles to the axis of the said stud s^2 . The outer end of the arm h is forked at h' to accommodate the stud s^2 .

By this construction it will be observed that with the raising or lowering of the arms h j , the movement of the coupling about the pivot u will compensate for the variance in the arcs described by the two arms h and j and that said movement will also permit a vertical adjustment of the inner end of the arm j , adjusting the machine to different types of records. The screw threaded connection between the shanks s and q will permit of that lateral movement of the arm j incidental to adjusting the machine, and regulating the compression of the gasket t .

It is to be noted, however, that there is no oscillatory movement about either of these pivots while the arm j is transmitting sound vibrations indicated upon a record, to the diaphragm.

In practice, I have found that great difficulty is encountered in holding the reproducing stylus or point in a mount carried upon the end of the transmitter arm. If the set screw extends horizontally it will not loosen when the instrument is being used upon a lateral cut record, but will become readily loosened if the instrument is used upon a vertical cut record. If the retaining screw be arranged vertically, I have found that it will not loosen when used with a vertical cut record, but will loosen when used with a lateral cut record. To obviate this condition, I set the screw at an angle between the vertical and the horizontal, and I have found in practice that when so set it has little or no tendency to loosen whether the instrument be used with either a vertical or a lateral cut record.

In the accompanying drawings I have shown a metallic mount j' carrying a set screw j^2 set at an angle between the vertical and the horizontal, the reproducing stylus or point being shown at j^3 .

In using the instrument there is a tendency of the spring i to draw the arms j and h downwardly to an extent to bring the point j^3 into engagement with the slab c or the table b . To prevent damage to a point prior to its application to a record, as well as to facilitate the removal and mounting of the points in the mount j' , I provide a rest v adapted to engage the arm h and prevent excessive downward movement thereof under the spring i . To prevent any possibility of a lateral displacement of this arm h when a point is being mounted therein or removed therefrom I provide said rest v with the lugs v' and v^2 between which the arm h is adapted to seat.

The operation of the herein described device, excepting in so far as the transmission of the sound waves is concerned, is substantially as follows:—

When it is desired to use the instrument upon vertical cut or graphophone records, the cord m is disengaged from the hook o and the weight l is permitted to drop within the cabinet, thus applying stress to the diaphragm f proportionate to the pull exerted by the weight l . With the operation of the machine, this weight remains constant, and hence when it is once determined under what pressure it is desired to place the diaphragm, it is merely necessary to apply the desired weight thereto, thus insuring uniform conditions. The spring n does not in any way interfere with the application of the tensioning weight to the diaphragm, as this weight will merely bring the tension of this spring

to a point where it will sustain its weight. The spring n has this characteristic, however, that with the flexure or displacement of the diaphragm f , the movement of the weight l must be transmitted through this spring. Hence, any tendency of the weight l to be sluggish in its movement, will be compensated for by this interposed spring, which will flex and permit the desired rapid vibrations in the diaphragm while subjecting it at all times to a pressure equaling that of the weight. This condition arises when sound vibrations of high frequency and short length are passing to the diaphragm. With longer vibrations, a spring interposed in the cord m is not necessary. For a universal machine, however, I prefer to include this spring in the connecting means between the weight and the diaphragm.

When it is desired to adjust the machine for use with lateral cut or gramophone records, it is merely necessary for the user to raise the cord m and with it the weight l and adjust this cord about the hook o . This movement will deflect the arm j and the connecting loop k which is preferably of waxed cord, in a manner to apply the stress exerted by the weight l at an angle to the axis of the diaphragm, as shown more particularly in Fig. 2 of the drawings.

The function of the universally movable connection between the transmitter or vibrator arm j and the supporting arm h has heretofore been referred to, and will not be repeated.

When the spring n is used in connection with the cord m , any loss of flexibility in this spring will not affect the tension upon the diaphragm, as this tension is derived solely from the weight l .

I believe it to be broadly new to provide a phonograph wherein a tensioning stress is placed upon the diaphragm by means of a weight, thus insuring a definite, uniform and constant tensioning of the diaphragm. While I have used a spring for this purpose, I have found in actual practice that a weight not only gives better results by reason of the better tensioning effect upon the diaphragm, but permits the convenient insulation of the tensioning means, and also facilitates, when an adjustable machine is used, the variance in direction of application of pressure without materially affecting the tensioning of the diaphragm.

I also believe it to be broadly new to connect the weight to the transmitter or vibrator arm by a flexible member having an elastic section in its length whereby before the inertia of the weight is overcome, flexure of the diaphragm will be permitted to an extent to make the diaphragm responsive to sound vibrations of high frequency and short length.

Having described my invention, what I

claim as new and desire to have protected by Letters Patent, is:—

1. A phonograph, embodying therein a movable record support, a sound box adjacent thereto and spaced away therefrom, a diaphragm mounted in said sound box, a transmitter or vibrator arm adapted to carry a reproducing stylus or point, projecting from adjacent said sound box over said record support, means whereby sound vibrations are transmitted from said arm to said diaphragm, means acting on said arm intermediate the diaphragm and the record support, whereby a downward pressure is exerted thereon, a weight, and a flexible, nonresonant strand connecting said weight and said arm adjacent said diaphragm, whereby said diaphragm and the means transmitting vibrations thereto from said arm are placed under constant, uniform tension.

2. A phonograph embodying therein a movable record support, a sound box adjacent thereto and spaced away therefrom, a diaphragm mounted in said sound box, a transmitter or vibrator arm adapted to carry a reproducing stylus or point, projecting from adjacent said sound box over said record support, means whereby sound vibrations are transmitted from said arm to said diaphragm, means acting on said arm intermediate the diaphragm and the record support, whereby a downward pressure is exerted thereon, a tensioning member, and a flexible non-resonant strand connecting said tensioning member and said arm adjacent to said diaphragm, whereby said diaphragm and the means transmitting vibrations thereto from said arm are placed under constant, uniform tension.

3. A phonograph embodying therein a movable record support, a sound box adjacent thereto and spaced away therefrom, a diaphragm mounted in said sound box, a transmitter or vibrator arm adapted to carry a reproducing stylus or point, projecting from adjacent said sound box over said record support, means whereby sound vibrations are transmitted from said arm to said diaphragm, means acting on said arm intermediate the diaphragm and the record support, whereby a downward pressure is exerted thereon, a tensioning member, and connections between said tensioning member and said arm adjacent to said diaphragm, whereby said diaphragm and the means transmitting vibrations thereto from said arm are placed under constant, uniform tension, said last named connections having an elastic section therein whereby flexure of the diaphragm is permitted without overcoming the inertia of said tensioning member.

4. A phonograph embodying therein a movable record support, a sound box ad-

jacent thereto and spaced away therefrom, a diaphragm mounted in said sound box, a transmitter or vibrator arm adapted to carry a reproducing stylus or point, projecting
 5 from adjacent said sound box over said record support, means whereby sound vibrations are transmitted from said arm to said diaphragm, means acting on said arm intermediate the diaphragm and the record support, whereby a downward pressure is exerted thereon, a tensioning member, a coiled spring, and flexible cords extending therefrom to said tensioning member and to said arm adjacent said diaphragm respectively,
 10 whereby said diaphragm and the means transmitting vibrations thereto from said arm are placed under constant, uniform tension, and flexure of the diaphragm is permitted without overcoming the inertia of said tensioning member.

5. A phonograph embodying therein a movable record support, a sound box adjacent thereto and spaced away therefrom, a diaphragm mounted in said sound box, a transmitter or vibrator arm adapted to carry a reproducing stylus or point, projecting
 25 from adjacent said sound box over said record support, means whereby sound vibrations are transmitted from said arm to said diaphragm, means acting on said arm intermediate the diaphragm and the record support, whereby a downward pressure is exerted thereon, a tensioning member, a flexible, non-resonant strand connecting said tensioning member and said arm adjacent said diaphragm, whereby said diaphragm and the means transmitting vibrations thereto
 30 from said arm are placed under constant, uniform tension, and means adapted to be engaged by said flexible strand whereby the direction of the stress of said tensioning member upon the diaphragm may be varied to adapt the instrument to a lateral cut or gramophone record.

45 6. A phonograph embodying therein a movable record support, a sound box adjacent thereto and spaced away therefrom, a diaphragm mounted in said sound box, a transmitter or vibrator arm adapted to carry a reproducing stylus or point, projecting
 50 from adjacent said sound box over said record support, means whereby sound vibrations are transmitted from said arm to said diaphragm, means acting on said arm intermediate the diaphragm and the record support, whereby a downward pressure is exerted thereon, a tensioning member, a flexible non-resonant strand connecting said tensioning member and said arm adjacent said diaphragm, whereby said diaphragm and the means transmitting vibrations thereto from
 60 said arm are placed under constant, uniform tension, and a projection or hook adjacent said sound box adapted to be engaged by said flexible strand, whereby the direction of the

stress of said tensioning member upon the diaphragm may be varied to adapt the instrument to a lateral cut or gramophone record.

7. A phonograph embodying therein a movable record support, a sound box adjacent thereto and spaced away therefrom, a diaphragm mounted in said sound box, a transmitter or vibrator arm adapted to carry a reproducing stylus or point, projecting
 75 from adjacent said sound box over said record support, means whereby sound vibrations are transmitted from said arm to said diaphragm, means acting on said arm intermediate the diaphragm and the record support, whereby a downward pressure is exerted thereon, a weight, a flexible non-resonant strand connecting said weight and said arm adjacent said diaphragm, whereby
 80 said diaphragm and the means transmitting vibrations thereto from said arm are placed under constant, uniform tension, and means adapted to be engaged by said connections whereby the direction of the stress of said weight upon the diaphragm may be varied
 90 to adapt the instrument to a lateral cut or gramophone record.

8. A phonograph embodying therein a movable record support, a sound box adjacent thereto and spaced away therefrom, a diaphragm mounted in said sound box, a transmitter or vibrator arm adapted to carry a reproducing stylus or point, projecting
 95 from adjacent said sound box over said record support, means whereby sound vibrations are transmitted from said arm to said diaphragm, means acting on said arm intermediate the diaphragm and the record support, whereby a downward pressure is exerted thereon, a weight, a coiled spring, flexible
 100 cords extending therefrom to said weight and to said arm adjacent said diaphragm respectively, whereby said diaphragm and the means transmitting vibrations thereto from said arm are placed under constant, uniform
 105 tension, and flexure of the diaphragm is permitted without overcoming the inertia of said weight, and means adapted to be engaged by said cord between said spring and said weight whereby the direction of stress of said weight upon the diaphragm may be
 110 varied to adapt the instrument to a lateral cut or gramophone record.

9. In a phonograph embodying therein a transmitter or vibrator arm, and a supporting arm therefor, a combined universally movable pivotal connection and vibration insulation between the two, comprising a stem fitted to said transmitter or vibrator arm, a plate carried thereby, an insulating
 120 gasket between said plate and said arm, a fitting pivotally connected to said supporting arm and having a flange parallel with said plate, said stem and said fitting having co-operating screw threaded means whereby
 125 130

said parts may be drawn together and a pivotal movement of one of said parts relatively to the other is permitted, and an insulating gasket mounted between said plate and said flange, the surfaces of said plate and of said flange presented opposite to each other being concave.

10. In a phonograph embodying therein a diaphragm, a transmitter arm, a flexible connection between one end of said arm and said diaphragm, means tensioning the diaphragm comprising a weight and a flexible cord connecting said weight and said transmitter arm end.

11. In a phonograph embodying therein a diaphragm, a transmitter arm, a flexible connection between one end of said arm and said diaphragm, means tensioning the diaphragm comprising a weight and a flexible,

vibration absorbing cord connecting said weight and said transmitter arm end.

12. In a phonograph embodying therein a diaphragm, means tensioning the diaphragm comprising a weight, a flexible cord connecting said weight and said diaphragm, and a spring inserted in the length of said cord whereby said diaphragm may flex without overcoming the inertia of said weight.

In witness whereof, I have hereunto affixed my signature, in the presence of two subscribing witnesses, this 22nd day of October, 1912.

CLINTON B. REPP.

Witnesses:

OTTO MUNK,

EUGENE WENING.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

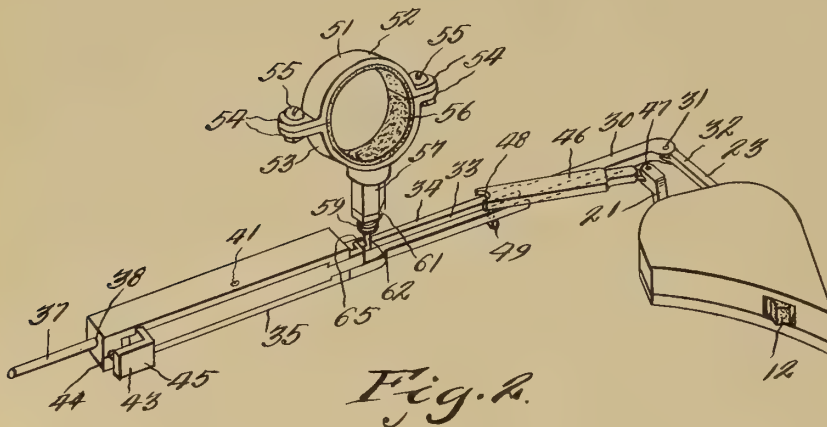
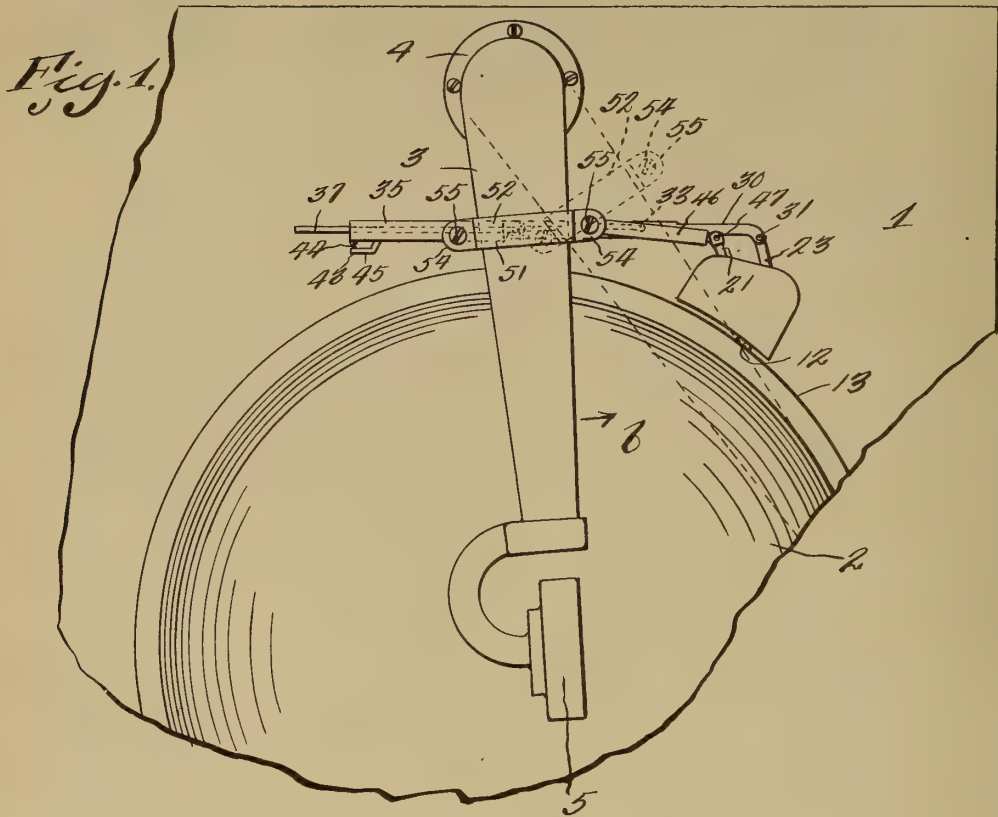
STOP FOR TALKING MACHINES,
#1,215,446-----W.S.Ward,
Patented-February 13th, 1917.
Filed-April 14th, 1916.

W. S. WARD.
STOP FOR TALKING MACHINES.
APPLICATION FILED APR. 14, 1916.

1,215,446.

Patented Feb. 13, 1917.

2 SHEETS—SHEET 1.



Witnesses
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Francis G. Bernell

Inventor
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Attorneys

W. S. WARD.
STOP FOR TALKING MACHINES.
APPLICATION FILED APR. 14, 1916.

1,215,446.

Patented Feb. 13, 1917.

2 SHEETS—SHEET 2.

Fig. 3.

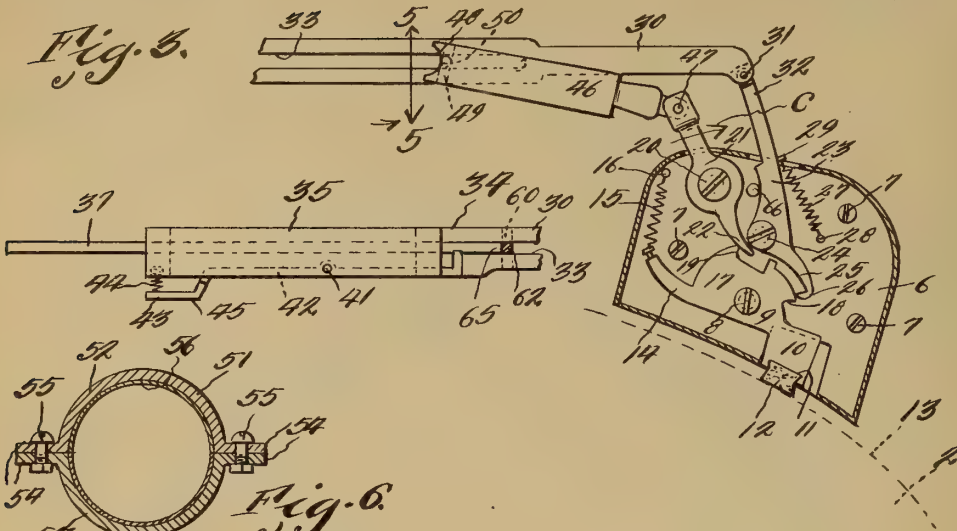


Fig. 6.

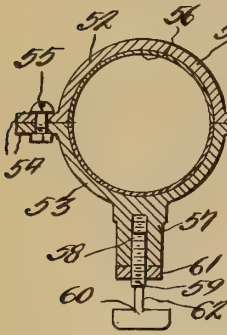


Fig. 4.

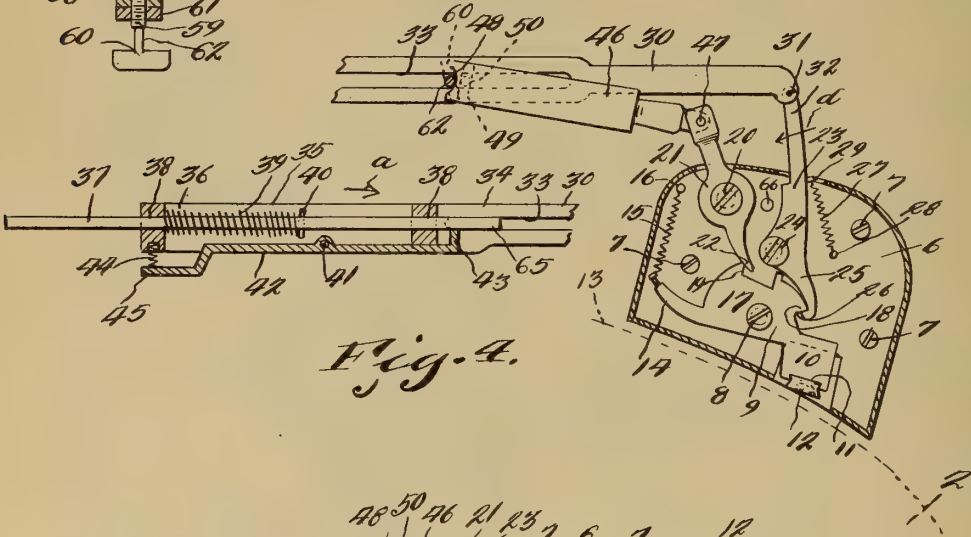
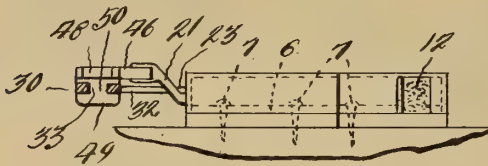


Fig. 5.



Witnesses
Philip J. Conell
Francis S. Conell

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UNITED STATES PATENT OFFICE.

WILLIAM S. WARD, OF CHARLOTTESVILLE, VIRGINIA.

STOP FOR TALKING-MACHINES.

1,215,446.

Specification of Letters Patent.

Patented Feb. 13, 1917.

Application filed April 14, 1916. Serial No. 91,081.

To all whom it may concern:

Be it known that I, WILLIAM S. WARD, a citizen of the United States, residing at Charlottesville, in the county of Albemarle, State of Virginia, have invented a new and useful Stop for Talking-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to the art of talking machines, and more especially to an improved stop and starting mechanism, automatically actuated by the tone or sound arm, for automatically stopping and starting the record supporting turn table.

It is known that owing to pieces, songs and the like varying in length, records of talking machines correspondingly vary. In other words, as is termed in the commercial field, there are what are known as deep and shallow records. Therefore, it is an object of the present invention to provide a stop and starter, which may be adjusted according to the record, in order to be automatically actuated by the tone or sound arm, at the beginning and the termination of the record.

Another object of the invention is to provide a stop and starter mechanism of this kind comprising simple, improved, efficient and practical features of construction.

One of the features of construction is the provision of a brake lever including a brake to frictionally engage the peripheral edge of the turn table of the talking machine for arresting the table in its movement, in combination with a pair of levers, to which link members are connected, one link being slidably connected to the other link, and adapted to be actuated by a member on the tone or sound arm to actuate the brake lever, in order to remove the brake shoe from the table, the other lever to which one of the links is connected is actuated by a spring to hold the brake shoe out of engagement with the table.

Another feature of the invention is the provision of adjustable means upon one end of the other means, designed to be actuated by the member on the tone or sound arm, to actuate the lever which is holding the brake lever, to release the brake lever and allow its shoe to again engage the table.

Another object of the invention is to con-

struct means carried by one of the links to be engaged by the member on the tone arm as it reaches the limit of its inward movement with novel features of construction, whereby said means may be adjusted, to stop the machine, relative to the extent of movement of the tone arm, whereby the brake lever will operate with promptness and with precision.

In practical fields the details of construction may necessitate alterations, falling within the scope of what is claimed.

The invention comprises further features and combination of parts, as hereinafter set forth, shown in the drawings and claimed.

In the drawings:

Figure 1 is a plan view of a portion of a talking machine, showing the automatic stop and starting mechanism as applied, whereby the mechanism may be operated automatically by the tone or sound arm.

Fig. 2 is a perspective view of the stop and starting mechanism detached.

Fig. 3 is a plan view of the stop and starting mechanism, showing the casing for the brake lever in section and showing the means to be actuated by a member on the tone arm at the beginning and ending of the movement of the tone arm broken, and the part broken away disposed below.

Fig. 4 is a view partly in plan elevation and partly in section, and illustrating parts broken, one part above the other, so that the various elements of the mechanism may be illustrated on a large scale.

Fig. 5 is a sectional view on line 5—5 of Fig. 3, looking toward the casing, in which the brake lever is arranged. Fig. 6 is a sectional view of the member to be carried by the tone or sound arm for actuating the stop and starting mechanism.

Referring more especially to the drawing, 1 designates a portion of the casing of a talking machine, and in which casing the motor for driving the record supporting turn table 2 is designed to be arranged. The tone or sound arm 3 is mounted upon the casing 1 pivotally as at 4, whereby the arm may swivel or move pivotally in a lateral direction, so that the stylus or needle of the reproducer or sound box 5 may follow the record groove from its beginning to its termination near the center of the disk. A plate 6 is secured to the casing 1 by means of suitable screws 7. Pivoted

by means of a screw 8 to the plate 6 is a brake lever 9, one arm 10 of which is provided with a dove-tailed recess 11, to receive and hold a suitable brake shoe 12, which may be constructed from any suitable material, rubber, felt or the like, and designed to frictionally engage the peripheral edge 13 of the record supporting turn table, to hold the table at rest. The brake lever 9 has connected to its other arm 14 a suitable coil spring 15, which is in turn connected to the stud 16, the spring 15 actuating and holding the brake lever, so that the brake shoe 12 frictionally engages the peripheral edge of the table. The brake lever 9 has an enlarged segmental portion 17, which is provided with the shoulders 18 and 19. Pivoted on a screw 20 of the plate 6 is a dog 21, the nose 22 of which is designed to engage the shoulder 19, when the dog 21 is rocked upon its pivot, so as to oscillate the brake lever 9, to throw the brake shoe 12 out of engagement with the peripheral edge of the turn table 2. A detent lever 23 is pivoted upon the screw 24 of the plate 6, and the arm 25 of said detent lever is provided with an angled end 26, to engage the shoulder 18, to hold the brake lever when thrown to the position shown in Fig. 4, with the brake shoe 12 out of engagement with the peripheral edge 13 of the turn table. One end of a coil spring 27 is connected to a stud pin 28, and has its other end connected to a pin 29 of the detent lever 23, so as to hold the angled end 26 of the detent lever 23 in engagement with the shoulder 18. A link 30 has one end pivotally connected by means of a pin 31 to the arm 32 of the detent lever 23. This link is provided with a slot 33, which is constructed substantially midway the center of the link 30. The end portion 34 of the link 30 has an enlargement 35, which is provided with an elongated slot 36, which is in a transverse plane at right angles to the slot 33. A rod 37 is adjustably mounted in the opening 38 of the ends of the enlargement 35, there being a coil spring 39 in the slot 36 and surrounding the rod 37, and interposed between the transverse pin 40 and one end of the slot 36 of the enlargement, the tendency of the spring 39 being to throw the rod in the direction of the arrow *a*. However, pivotally mounted upon a pin 41 of the enlargement 35 and disposed partly in one of the open sides of the slot 36 is a detent lever 42 having an angled bent end 43 at one end, and a spring 44 between the offset bent end 45 and one end of the enlargement, thereby acting to hold the angled end 43 in engagement with the circumference of the rod 37, to hold the rod 37 in different adjusted positions against the action of the spring 39. A link 46 is pivoted by means of a pin 47 to one end

of the dog 21. The other end of the link 46 is provided with a semi-circular crotch or recess 48, and a downwardly projecting T-shaped lug 49, the shank 50 of which engages the side walls of the slot 33 of the link 30, while the T-shaped portion 49 of which engages the under face of the link 30. A clamp 51 consisting of two members 52 and 53 the ears 54 of which are secured together by the bolt 55 is clamped upon the tone or sound arm 3 in a suitable position, there being a suitable band of felt or the like 56 between the clamp and the arm, so as to prevent scratching or injuring the tone arm. The member or section 53 of the clamp has a downwardly protruding extension 57 provided with a threaded bore 58, into which the shank 59 of a T-shaped pin 60 is threaded, there being a suitable lock nut 61 for holding the T-shaped pin in adjusted position in the threaded bore. The reduced part 62 of the shank of the T-shaped pin engages the elongated slot 33 of the link 30, while the head of the T-shaped pin engages the under face of the link 30 adjacent the slot 33. The plate 6 is provided with a suitable inclosure or casing, that fits downwardly upon the same to protect the various elements carried upon said plate. When the talking machine is at rest the brake lever 9 is in the position shown in Figs. 1 and 3, so that the brake shoe engages the peripheral edge 13 of the turn table. After a record is placed upon the turn table, the tone or sound arm is moved in the direction of the arrow *b* in Fig. 1, until the reduced part 62 of the T-shaped pin 60 engages the crotch 48 of the link 46, and by further movement of the pin 60 the dog 21 is tilted upon its pivot in the direction of the arrow *c*, thereby causing the nose 22 to rock the brake lever upon its pivot against the action of the spring 15, so that the angled end 26 will engage the shoulder 18, thereby holding the brake lever in the position shown in Fig. 4, the result of which permits the turn table to rotate, and the record therewith. When the stylus of the sound box or reproducer reaches the end of the sound groove, the rod 37 having been adjusted accordingly, the reduced part 62 of the T-shaped pin 60 will contact with the end 65 of the rod 37, thereby pulling upon the link 30, which will rock the detent lever 23 in the direction of the arrow *d*, thereby disengaging the angled end 26 of the detent lever from the shoulder 18, thereby allowing the brake shoe to engage the periphery 13 of the turn table to stop the machine. The stud pin 66 limits the movement of the detent lever 23.

The invention having been set forth, what is claimed as new and useful is:

1. In a stopping and release device for talking machines, a plate on the casing of the

machine, a spring tensioned brake lever pivoted to the plate and having a brake shoe to engage the peripheral edge of the turn table of the talking machine, a dog movably mounted upon the plate, and a link pivoted to said dog and designed to be actuated by a member upon the tone arm of the machine to actuate the dog to operate the brake lever, whereby the shoe is thrown out of engagement with the table, and a detent lever to engage the brake lever to hold its shoe out of engagement with the table, and means pivotally connected to the detent lever and adapted to be actuated by the member on the tone arm to disengage the detent lever from the brake lever, allowing the spring tensioning means of the brake lever to actuate the same to throw the shoe in contact with the table.

2. In a stopping and release device for talking machines, a pivoted spring tensioned brake lever having a brake shoe to engage the edge of the turn table of a talking machine, a dog to actuate the brake lever to throw its shoe out of engagement with the table, a link pivoted to the dog and designed to be actuated by a member on the tone arm to operate the dog, a detent lever, said brake lever having a shoulder to be engaged by one end of the detent lever to hold the brake lever with its shoe out of engagement with the table, a link pivoted to the other arm of detent lever and having an elongated slot, in which the first link is slidably connected, said slotted link at one end having adjustable means to be engaged by the member on the tone arm for pulling the slotted link and actuating the detent lever to release the brake lever.

3. In a stopping and release device for talking machines, a pivoted spring tensioned brake lever having a brake shoe to engage the edge of the turn table of a talking machine, a dog to actuate the brake lever to throw its shoe out of engagement with the table, a link pivoted to the dog and designed to be actuated by a member on the tone arm to operate the dog, a detent lever, said brake lever having a shoulder to be engaged by one end of the detent lever to hold the brake lever with its shoe out of engagement with the table, a link pivoted to the other arm of detent lever and having an elongated slot, in which the first link is slidably connected, said slotted link having at one end an enlargement provided with a slot, a rod mounted in openings of ends of the enlargement to be engaged by the member on the tone arm for pulling the slotted link and actuating the detent lever to release the brake lever, spring tensioning means for said rod, and a spring tensioned detent lever mount-

ed in said second slot to hold the rod in adjusted positions.

4. In a stopping and release device for talking machines, a pivoted spring tensioned brake lever having a brake shoe to engage the edge of the turn table of the machine, and provided with a shoulder, a pivoted dog to engage said shoulder to rock the brake lever whereby the brake shoe will be moved out of engagement with the turn table, a link pivoted to the dog and designed to be engaged by a member of the tone arm to actuate the dog.

5. In a stopping and release device for talking machines, a pivoted spring tensioned brake lever having a brake shoe to engage the edge of the turn table of the machine, and provided with a shoulder, a pivoted dog to engage said shoulder to rock the brake lever, whereby the brake shoe will be moved out of engagement with the turn table, a link pivoted to the dog and designed to be engaged by a member of the tone arm to actuate the dog, said brake lever having a second shoulder, a pivoted detent lever having an angled end to engage the second shoulder for holding the brake lever with its shoe out of engagement with said turn table, and a link having means at one end to be engaged by a member on the tone arm to actuate the detent lever to release the brake lever.

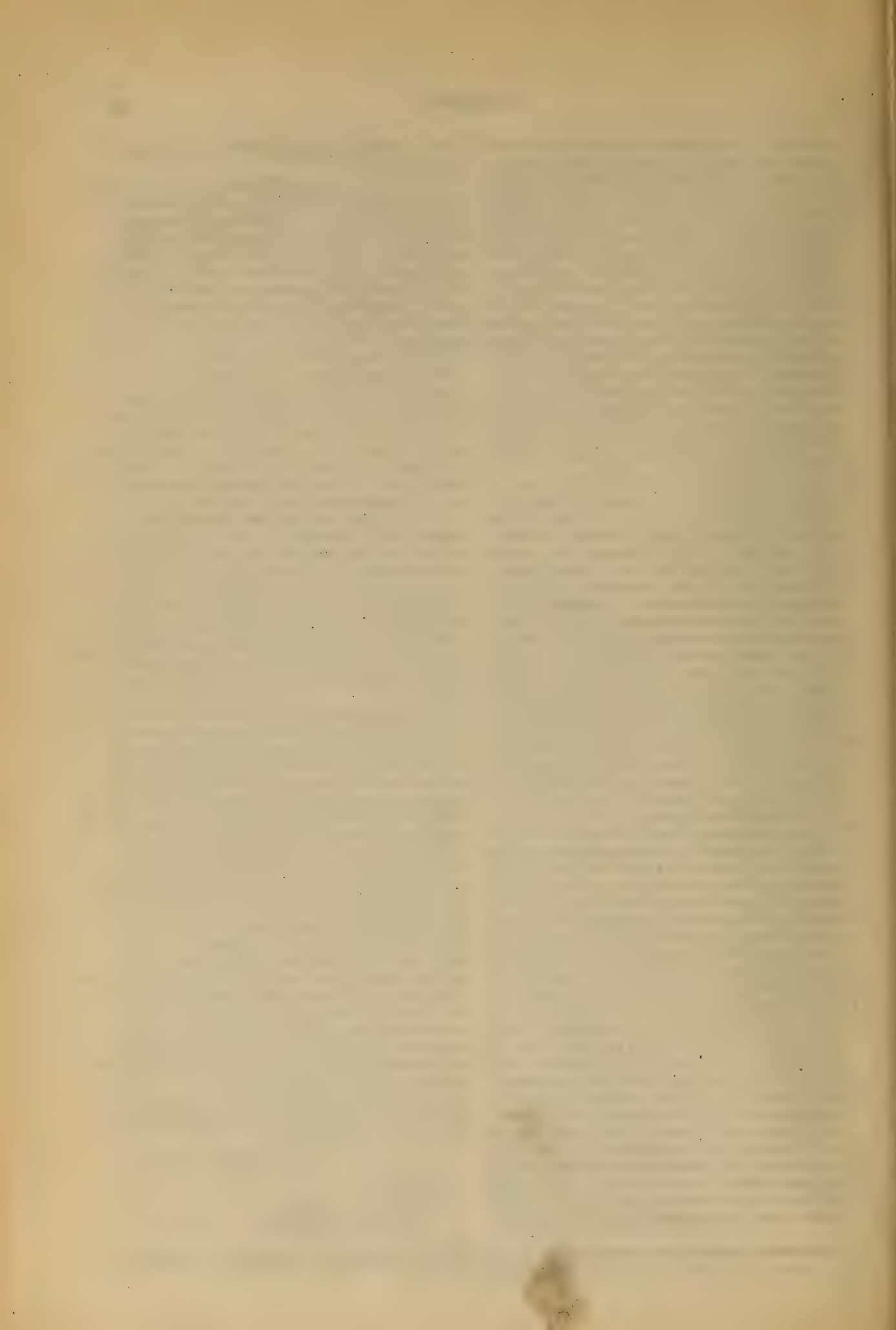
6. In a stopping and release device for talking machines, a pivoted spring tensioned brake lever having a brake shoe to engage the edge of the turn table of the machine, and provided with a shoulder, a pivoted dog to engage said shoulder to rock the brake lever, whereby the brake shoe will be moved out of engagement with the turn table, a link pivoted to the dog and designed to be engaged by a member of the tone arm to actuate the dog, said brake lever having a second shoulder, a pivoted detent lever having an angled end to engage the second shoulder for holding the brake lever with its shoe out of engagement with said turn table, and a link having means at one end to be engaged by a member on the tone arm to actuate the detent lever to release the brake lever, said means being adjustable according to the size of the record so that the member on the tone arm will engage therewith to release the detent lever from the brake lever.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM S. WARD.

Witnesses:

ALBERT F. OLIVER,
JAMES D. BELLOMY.



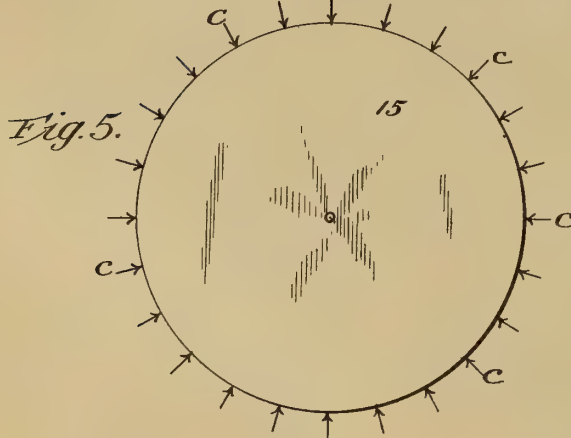
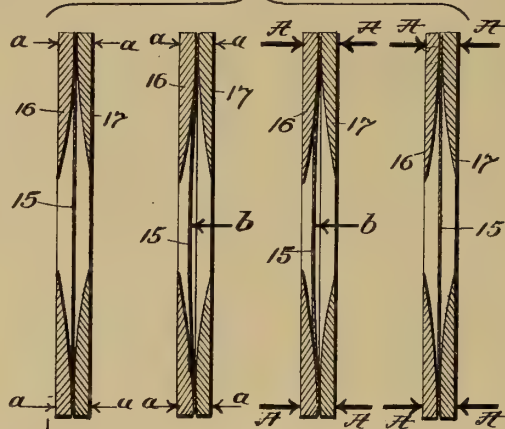
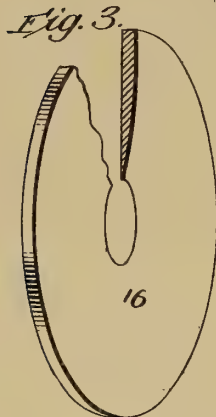
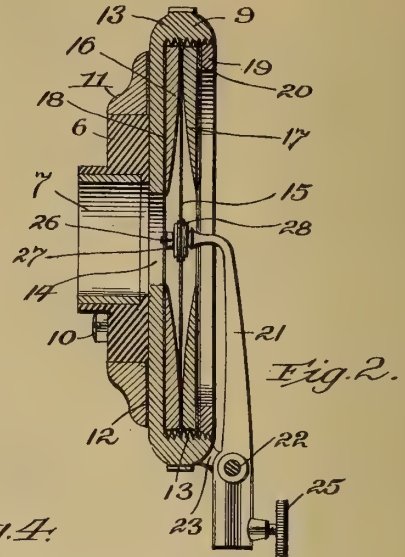
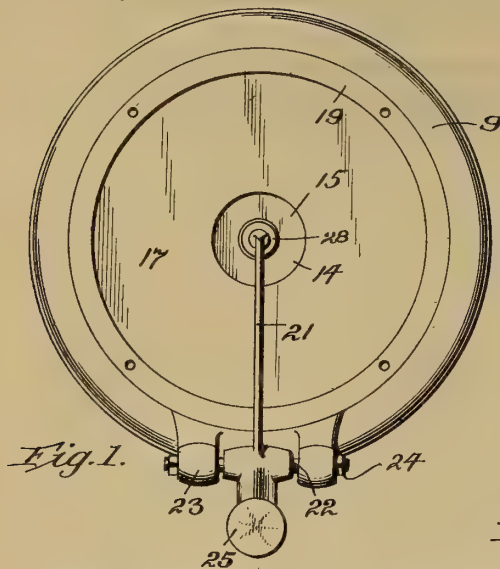
METHOD OF MOUNTING DIAPHRAGMS IN SOUND-
BOXES.

#1,215,500-----P. Dodge,
Patented-February 13th, 1917.
Filed-May 18th, 1915.

P. DODGE.
METHOD OF MOUNTING DIAPHRAGMS IN SOUND BOXES.
APPLICATION FILED MAY 18, 1915.

1,215,500.

Patented Feb. 13, 1917.



Inventor

Park Dodge.

UNITED STATES PATENT OFFICE.

PARKER DODGE, OF WASHINGTON, DISTRICT OF COLUMBIA.

METHOD OF MOUNTING DIAPHRAGMS IN SOUND-BOXES.

1,215,500.

Specification of Letters Patent.

Patented Feb. 13, 1917.

Application filed May 18, 1915. Serial No. 28,910.

To all whom it may concern:

Be it known that I, PARKER DODGE, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Methods of Mounting Diaphragms in Sound-Boxes, of which the following is a specification.

This invention relates to sound boxes for gramophones, graphophones and the like, and particularly to a method of mounting the diaphragm under a uniformly distributed radial compressive stress, to render the diaphragm relatively inert, to increase its freedom of vibration and to secure other incidental advantages.

I shall describe the method as applied to a sound box in which it secures peculiarly pronounced beneficial results, that being the sound box having conoidally recessed diaphragm-clamping means described and claimed in my prior application for patent, Serial Number 12,578, filed March 6, 1915. In another copending application, Serial Number 28,911 filed May 18, 1915, I describe and claim a sound box having a diaphragm held under a radial compressive stress. The present application is accordingly restricted to the preferred method of placing and maintaining a diaphragm under such stress.

In the accompanying drawing—

Figure 1 is a front elevation of a sound box in assembling which my present method may be practised;

Fig. 2 is an axial section thereof;

Fig. 3 is a perspective view of a clamping ring used in such sound box;

Fig. 4 consists of four cross sectional diagrams illustrating four successive steps in the method of mounting the diaphragm, only the diaphragm and clamping rings being shown; and

Fig. 5 is a face view of a diaphragm with the stresses to which it is finally subjected diagrammatically indicated.

In the drawings 6 represents the usual rubber connector sleeve for connecting the sound box or reproducer to the goose neck or tone arm of the machine on which it is to be used. The sleeve has the usual brass

lining tube 7 which fits over the end of the goose neck, and is provided with the usual bayonet lock pin (not shown). The cup-shaped body 9 of the sound box, which is of metal, is held to the connector sleeve 6 by means of screws 10 and by means of a metal weight ring 11 which closely embraces the sleeve 6 and is sealed to the rear face of the box-body 9 with a thin layer of bees-wax or similar plastic adhesive 12. The purpose of this weight is to damp any vibrations which might be set up in the box-body 9.

The box-body 9 is internally threaded as indicated at 13 and is provided with an aperture 14 leading through connector sleeve 6 to the goose neck or tone arm.

The diaphragm 15 which preferably is of mica is clamped between two rings 16 and 17 of substantially identical form, each having a central aperture which I prefer to make of substantially the size of aperture 14. The face of each of the rings 16 and 17 toward the diaphragm is a surface of revolution. The generating curve is tangent or approximately tangent to the contacting face of the diaphragm at or near its periphery and curves gradually away from such face toward the center of the diaphragm. The clearance between the opposed faces of the rings 16 and 17 need be only slightly greater than the maximum amplitude of vibration of the diaphragm and is somewhat exaggerated in the drawing. The rings 16 and 17 may be of any relatively rigid material. The best results have been secured with celluloid but successful use has been made of metals, for example aluminum and brass. The brilliancy of tone seems to increase with the hardness of the material used for the rings.

The rear ring 16 is sealed to the rear wall of the box body 9 by a thin layer 18 of bees-wax or similar adhesive plastic and the front ring 17 is pressed toward it by a nut ring 19. Paper gaskets 20 may be interposed between front ring 17 and nut ring 19, partly to equalize the pressure by their resiliency and partly to permit nut ring 19 to turn more freely on ring 17 in assembling the sound-box.

The vibrator or stylus arm 21 is mounted on cone pivot screws 22 which are threaded in lugs 23 and locked with check nuts 24. It has the usual needle socket in which needles may be clamped by the set screw 25. The stylus arm 21 is connected to the center of the diaphragm 15 by means of a threaded stud 26 and nut 27, the usual washers 28 being used to distribute the pressure.

The sound box so far described is that claimed in my application Serial No. 12,578. I have discovered that the tone quality secured with such a sound box, and to a certain extent with any sound box having a rigid diaphragm-mount, is improved by mounting the diaphragm under a radially acting compressive stress.

To secure this result I may proceed as follows: I first loosely assemble the diaphragm 15, rings 16 and 17, nut ring 19 and washers 20 in the box body 9. This condition is represented in the first diagram of Fig. 4 where the small force arrows *a* represent a light clamping pressure on rings 16 and 17 merely sufficient to hold the parts together.

The second step is to deflect the diaphragm 15 at the center by a pressure exerted manually or by means of a clamp. This contracts slightly the periphery of the diaphragm 15. This condition is illustrated in the second diagram of Fig. 4 where the arrow *b* represents the deflecting stress.

The third step is to set down the nut ring 19 tight while holding the diaphragm 15 deflected. This condition is illustrated in the third diagram of Fig. 4 where the arrows *A* represent the heavy clamping pressure resulting from setting down the nut ring 19.

The fourth step is to relieve the diaphragm from the deflecting stress whereupon it returns to the condition illustrated in the fourth diagram of Fig. 4. Here the heavy clamping pressure represented by the arrows *A* prevents the expansion of the periphery of the diaphragm so that the diaphragm remains under a uniformly distributed radial compressive stress as indicated in diagram in Fig. 5. In Fig. 5 the arrows *c* are meant to illustrate a uniformly distributed radially acting stress and not a plurality of localized stresses.

A substantially equivalent method is to clamp the diaphragm with a very moderate clamping pressure and then run the sound box on a number of very "heavy" or loud records and then immediately clamp the diaphragm very tight. If the first or moderate clamping pressure is correct it will permit the periphery of the diaphragm to draw in or contract under the stresses induced by vibration. The expansive pressure of the diaphragm will not however be sufficient to overcome the friction of clamping except possibly very slowly, and the final tight

clamping of the edge of the diaphragm thus holds this contracted.

Both methods have in common the idea of producing contraction of the periphery by deflection of the center, and of final clamping while this contraction exists.

A diaphragm so mounted is characteristically inert and non-resonant and very sensitive. The stressing increases the loudness and volume of sound secured in reproductions.

The increased sensitiveness introduces some difficulties, but such diaphragms can be used with marked success, for example in the particular type of sound box with which I have illustrated it.

Having thus described my invention, what I claim is:—

1. The method of mounting diaphragms in sound-boxes and the like, which consists in producing a contraction of the periphery of the diaphragm by deflecting the central portion of the diaphragm, and then positively clamping said periphery while contracted.

2. The method of mounting diaphragms in sound-boxes and the like, which consists in placing the diaphragm between a pair of clamping members adapted to engage its opposite faces at or near its periphery, producing a contraction of said periphery by deflecting the central portion of said diaphragm, and then forcing said clamping members together to clamp said diaphragm positively between them while its periphery is contracted.

3. The method of mounting diaphragms in sound-boxes and the like which consists in deflecting the central portion of the diaphragm to contract the periphery thereof, and then while maintaining said deflection positively clamping said contracted periphery.

4. The method of mounting diaphragms in sound-boxes and the like which consists in placing the diaphragm between a pair of clamping members adapted to engage its opposite faces at or near its periphery, deflecting the central portion of said diaphragm to contract its periphery, then while maintaining said deflection, clamping said diaphragm between said clamping members, and then relieving said diaphragm from the deflecting stress.

5. The method of mounting acoustic diaphragms which consists in contracting the periphery of the diaphragm by the application of force, and thereafter maintaining said contraction by means of a positive peripheral clamp.

6. The method of mounting acoustic diaphragms which consists in contracting the periphery of the diaphragm by the application of force, and thereafter maintaining

said contraction by the action of a rigid diaphragm mount, engaging the peripheral portion of said diaphragm.

5 7. The method of mounting acoustic diaphragms which consists in placing a diaphragm in contact with a rigid diaphragm mount; applying a distorting agency to cause the line of contact between the mount

and the periphery of the diaphragm to move inward relatively to the mount; causing the 10 mount to engage and hold the periphery of the diaphragm; and then terminating the action of said distorting agency.

In testimony whereof I have signed my name to this specification.

PARKER DODGE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

VIBRATION GOVERNING DEVICE FOR SOUND
REPRODUCING MACHINES.

#1,215,744-----W. J. Tanner,
Patented-February 13th, 1917.
Filed-January 9th, 1914.

W. J. TANNER.
VIBRATION GOVERNING DEVICE FOR SOUND REPRODUCING MACHINES.
APPLICATION FILED JAN. 9, 1914.

1,215,744.

Patented Feb. 13, 1917.

Fig. 1.

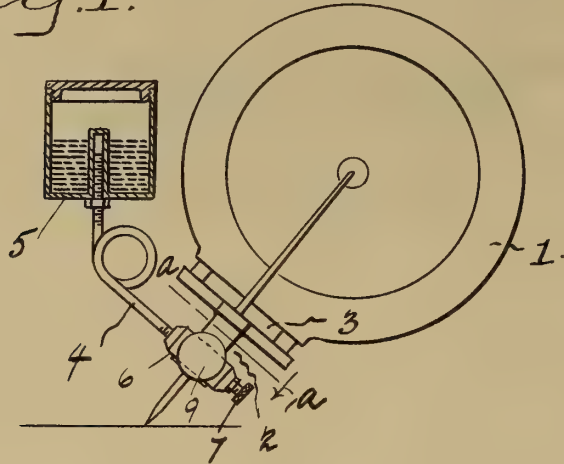


Fig. 2.

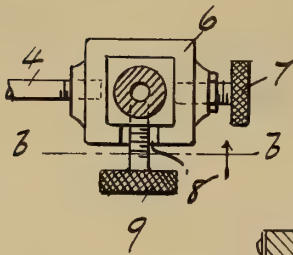


Fig. 3.

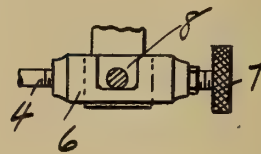
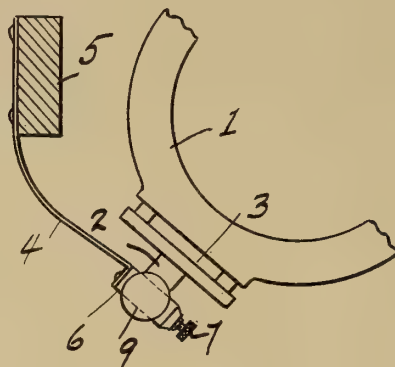


Fig. 4.



WITNESSES: *Fig. 5.*

*H. C. ...
A. Tanner*



INVENTOR

William J. Tanner

UNITED STATES PATENT OFFICE.

WILLIAM J. TANNER, OF BRIDGEPORT, CONNECTICUT.

VIBRATION-GOVERNING DEVICE FOR SOUND-REPRODUCING MACHINES.

1,215,744.

Specification of Letters Patent.

Patented Feb. 13, 1917.

Application filed January 9, 1914. Serial No. 811,205.

To all whom it may concern:

Be it known that I, WILLIAM J. TANNER, a citizen of the United States, and resident of Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Vibration-Governing Devices for Sound-Reproducing Machines, of which the following is a specification.

The invention consists of a device or attachment applicable to sound reproducing machines of various types but it is particularly useful with machines employing disk records. The object of the invention is to provide means for obviating the disadvantages caused by excessive vibration of the stylus holder of the reproducer forming part of machines of this kind.

The improved device may permanently be a part of the reproducer or it may be in the form of an attachment capable of being detachably secured to reproducers of various kinds employing a stylus carried by a holder, the latter having independent vibratory movement relatively to the main part of the reproducer.

In accordance with the invention, the device or attachment consists essentially of an arm suitably secured to the reproducer, and at the free end of the arm, a floating weight is carried. This weight is solid or it may be made hollow and to contain a liquid or a movable body, mercury preferably being employed. With either construction, the weight may be adjustably carried on the arm, which arm is secured to the stylus or needle holder, this holder being mounted in a carrier generally so attached to the casing of the reproducer that, to a limited extent, the carrier is allowed independent vibrating movement relatively to the reproducer casing.

The invention will be described in several forms hereinafter with reference to the accompanying drawings in which—

Figure 1 is an elevation of a complete reproducer with the improved device or attachment secured thereto;

Fig. 2 is a section taken on line *a— a* of Fig. 1, looking in the direction of the arrow;

Fig. 3 is a section taken on line *b— b* of Fig. 2 looking in the direction of the arrow;

Fig. 4 shows part of the reproducer in elevation and a solid weight in section, and

Fig. 5 shows a modified means for secur-

ing the weight carrying arm to the needle holder of the reproducer.

Referring to the drawings, particularly Figs. 1, 2 and 3, 1 represents the reproducer; 2 is the needle holder mounted in the carrier 3; 4 is an arm composed of wire, resilient but not sensitive to slight vibration. The weight 5, carried at the end of the arm 4, is in the form of a closed cup containing a movable body, for example mercury. The arm 4 is secured to the holder 2 by means of the frame 6 secured to the holder by set screw 7, the frame being slotted or cut away at 8 to clear the needle set screw 9. The weight 5 is screw threaded to the end of the arm in order that the weight may be adjusted to meet the requirements.

The purpose of the improved device is to eliminate the objectionable scratching or rasping sounds caused by excessive vibration of the needle together with the parts adjacent thereto. This undesirable vibration prevents the needle point from always following the record groove exactly. Consequently an imperfect tone is produced and the life of the record is shortened owing to the wearing away of the walls of the groove. With the improved device a governing effect is obtained and this effect is imparted to the vibrating stylus holder of the reproducer, the greater vibrations being governed by the resiliency of the arm carrying the weight and the lesser vibrations being governed by the movable body within the hollow weight. By means of this governing effect any vibration of the needle holder is controlled.

Fig. 4 illustrates a modified form of the invention, in which instance the weight 5 is solid and the arm 4 is composed of a flat spring sufficiently resilient so as to be sensitive to any vibration of the needle holder. Fig. 5 illustrates an alternative method of securing the weight carrying arm direct to the reproducer. In this instance the end of the arm is screw threaded and fitted in a threaded hole in the needle holder 2 or if desired the arm may be attached to the carrier 3.

I am aware it has heretofore been proposed to employ a variety of forms of governing devices for sound reproducing machines, such devices having a rigid arm provided with a counter balance weight and carrying the stylus or the arm is connected to the stylus holder. The arm is pivoted or

otherwise mounted in each instance, so that its movement is partly constrained, but according to my invention, the arm is resilient, therefore, the counterbalance weight

5 has a floating or universal movement whereby the vibration is more effectually controlled, particularly lateral vibration, which causes most of the bad effects hereinbefore mentioned.

10 I claim—

1. In a sound reproducer for machines of the class described, a vibrating stylus holder, an arm secured thereto and a weight containing a movable body carried by said

15 arm.

2. In a sound reproducer for machines of

the class described, a vibrating stylus holder, an arm secured thereto and an adjustable weight containing a movable body carried by said arm.

3. In a sound reproducer for machines of the class described, a vibrating stylus holder, a resilient arm secured thereto and a weight containing a movable body carried

20 by said arm.

Signed at Bridgeport, in the county of Fairfield and State of Connecticut.

25

WILLIAM J. TANNER.

Witnesses:

HELEN E. TANNER,

MINNIE L. TANNER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

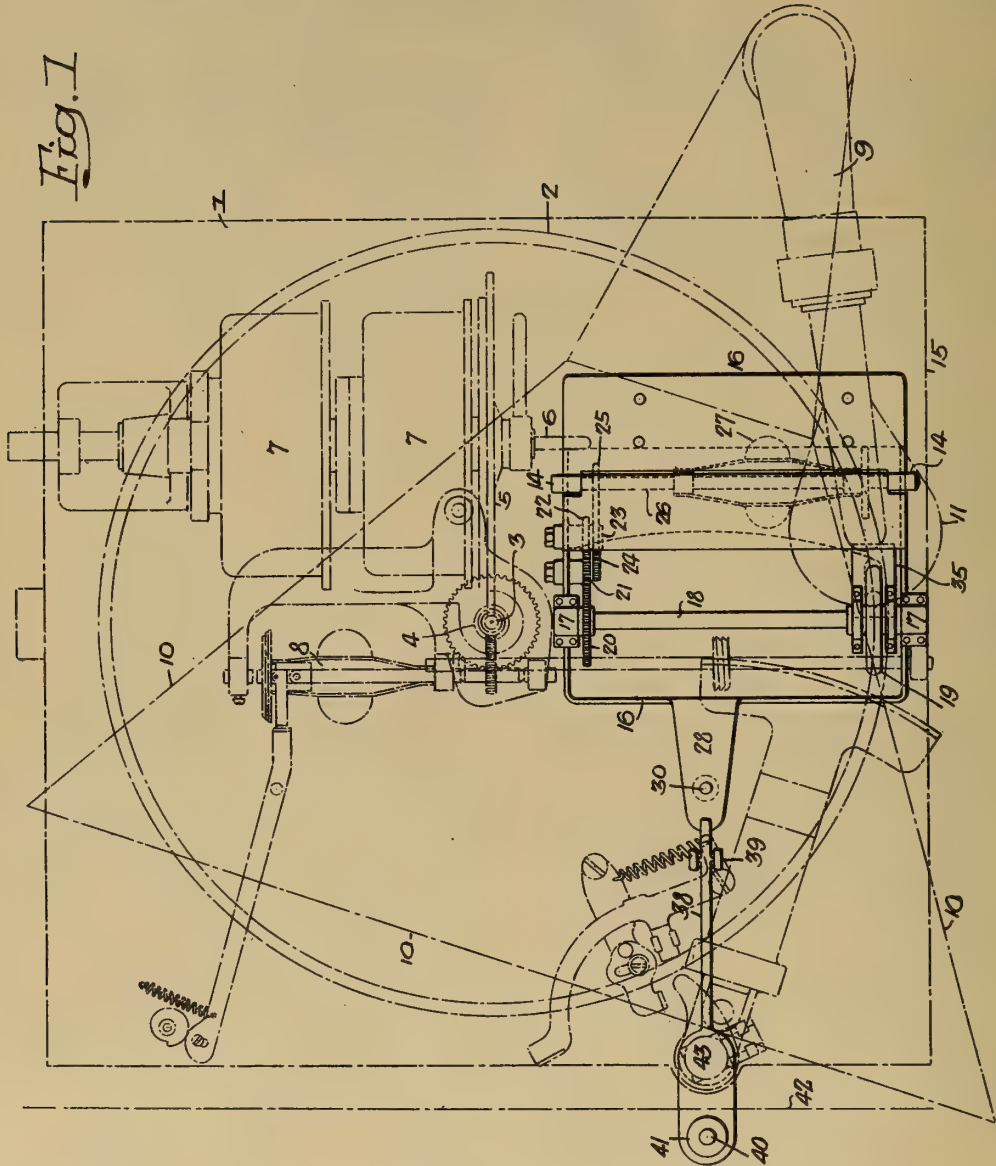
SPEED REGULATING DEVICE FOR
TALKING MACHINES,

#1,216,222-----J.F.H.Fechtenburg,
Patented-February 13th, 1917.
Filed-August 3rd, 1916.

J. F. H. FECHTENBURG.
 SPEED REGULATING DEVICE FOR TALKING MACHINES.
 APPLICATION FILED AUG. 3, 1916.

1,216,222.

Patented Feb. 13, 1917.
 7 SHEETS—SHEET 1.



Inventor—
 Jørgen F. H. Fechtenburg.
 by his Attorneys:
 Howson & Howson

J. F. H. FECHTENBURG.
SPEED REGULATING DEVICE FOR TALKING MACHINES.
APPLICATION FILED AUG. 3, 1916.

1,216,222.

Patented Feb. 13, 1917.

7 SHEETS—SHEET 2.

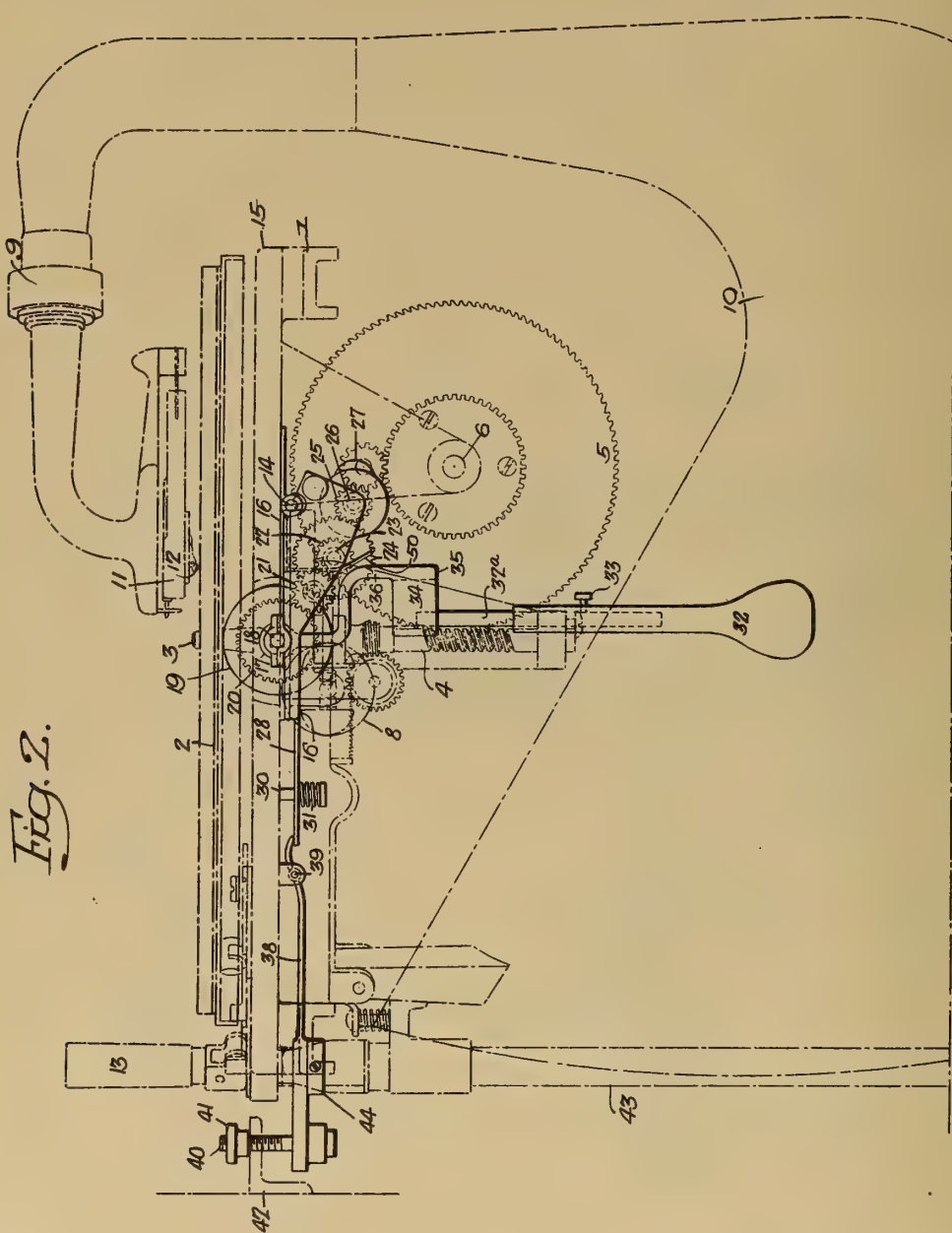
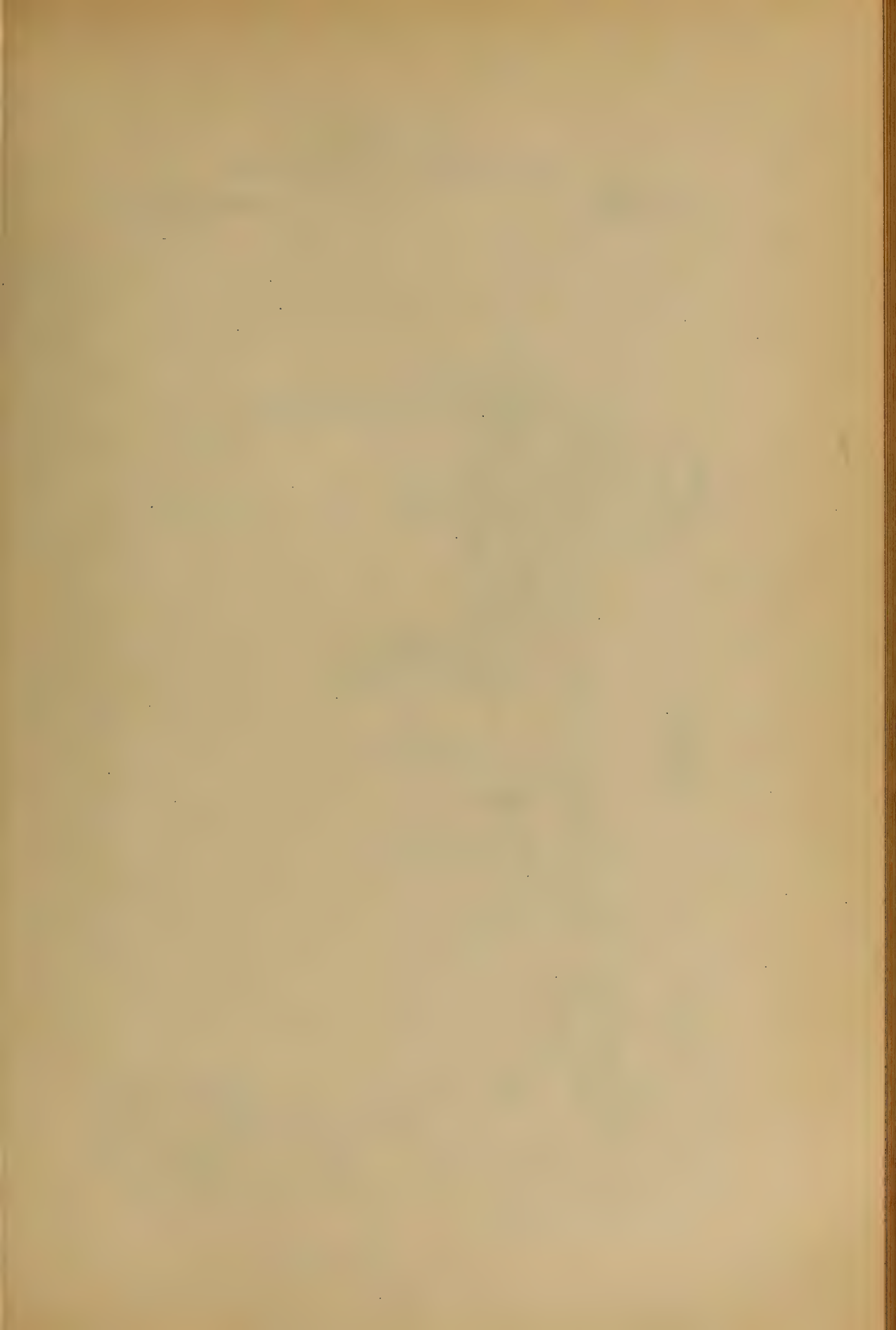


Fig. 2.

Inventor—
Jörgen F. H. Fechtenburg.
by his Attorneys:
Howan Howan



J. F. H. FECHTENBURG.
SPEED REGULATING DEVICE FOR TALKING MACHINES.
APPLICATION FILED AUG. 3, 1916.

1,216,222.

Patented Feb. 13, 1917.
7 SHEETS—SHEET 3.

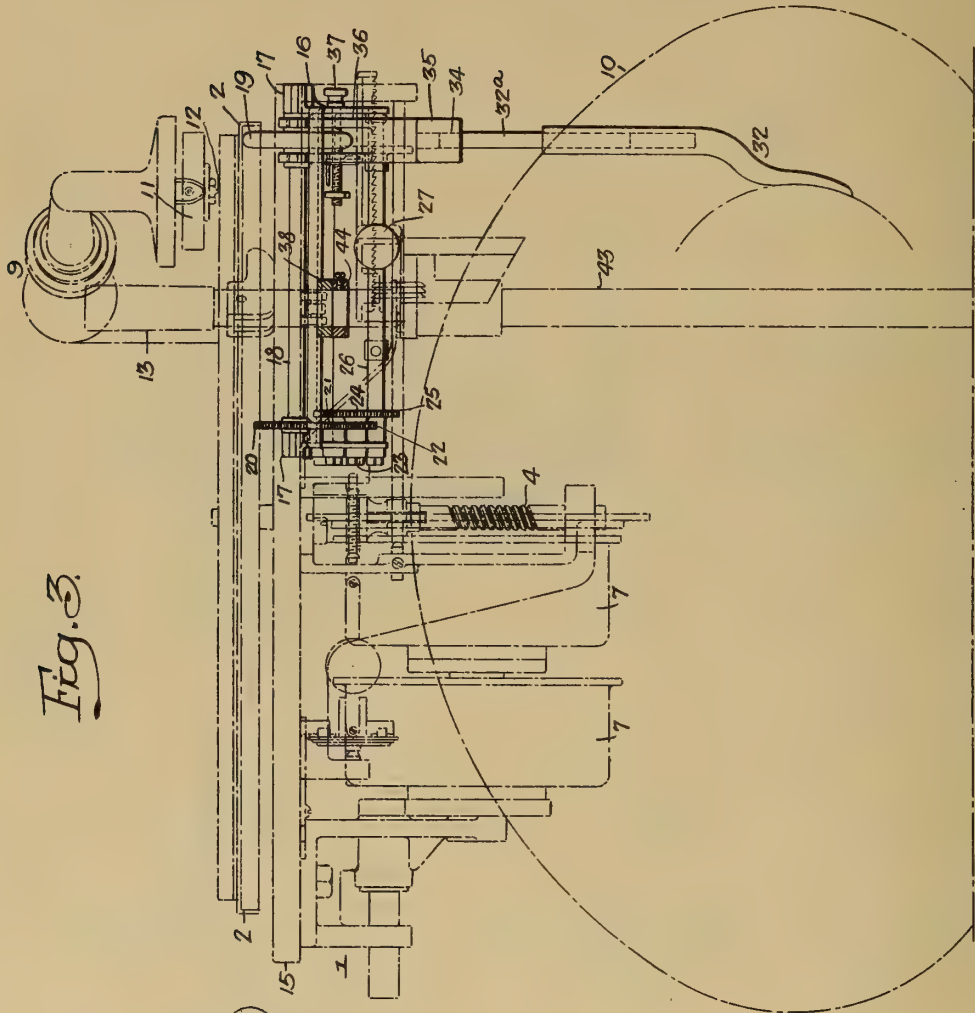


Fig. 3.

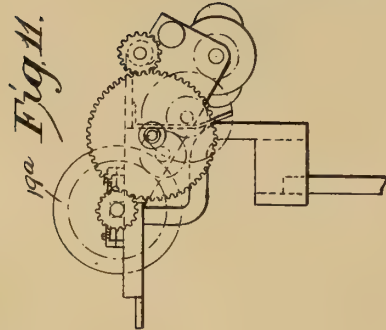


Fig. 11.

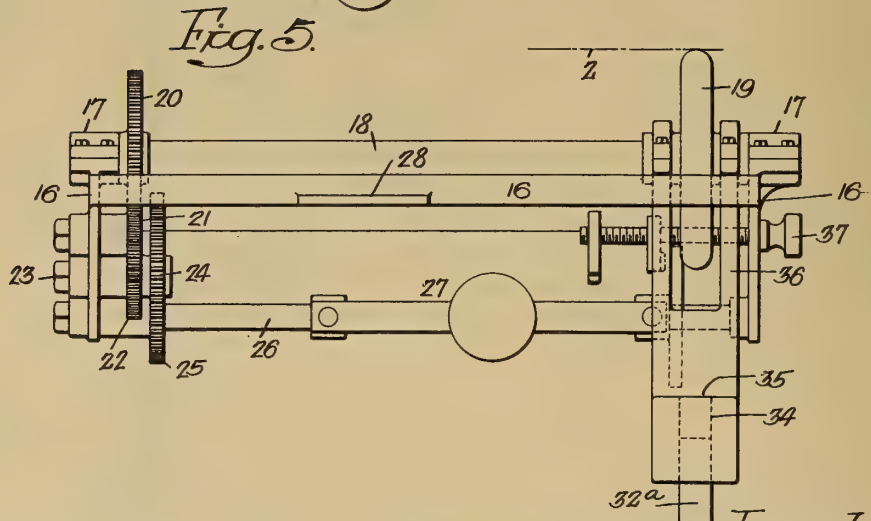
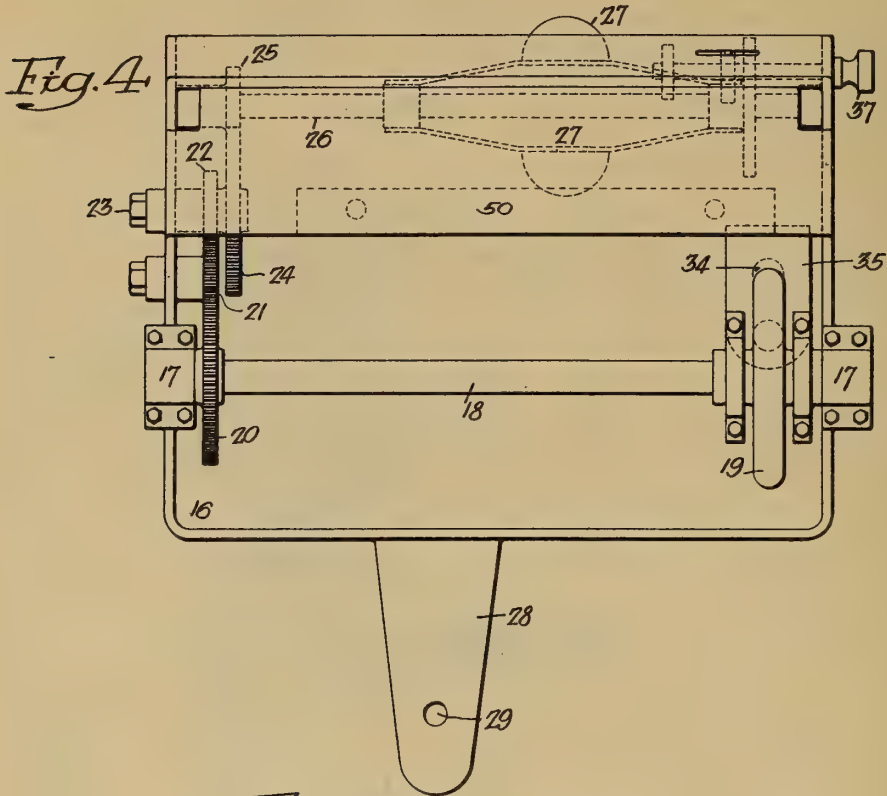
Inventor—
Jöngen F. H. Fechtenburg.
by His Attorneys—
Howson Howson

J. F. H. FECHTENBURG.
SPEED REGULATING DEVICE FOR TALKING MACHINES.
APPLICATION FILED AUG. 3, 1916.

1,216,222.

Patented Feb. 13, 1917.

7 SHEETS—SHEET 4.



Inventor—
Jörgen F. H. Fechtenburg.
by his Attorneys—
Howland Brown

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SPEED REGULATING DEVICE FOR TALKING MACHINES.
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7 SHEETS—SHEET 5.

Fig. 6.

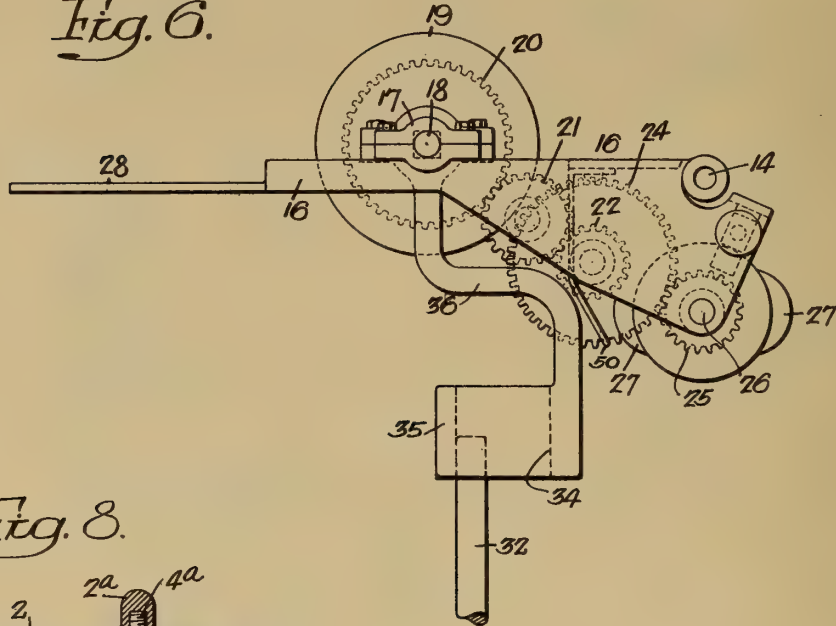


Fig. 8.

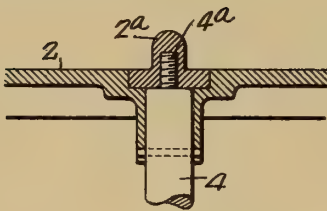


Fig. 7.

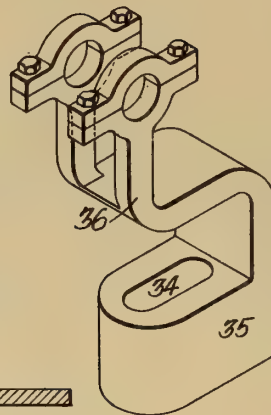
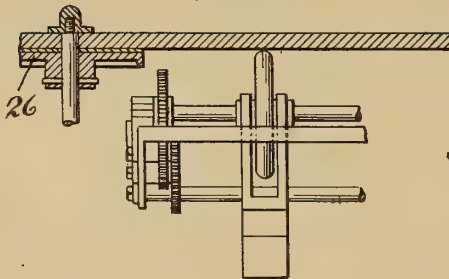


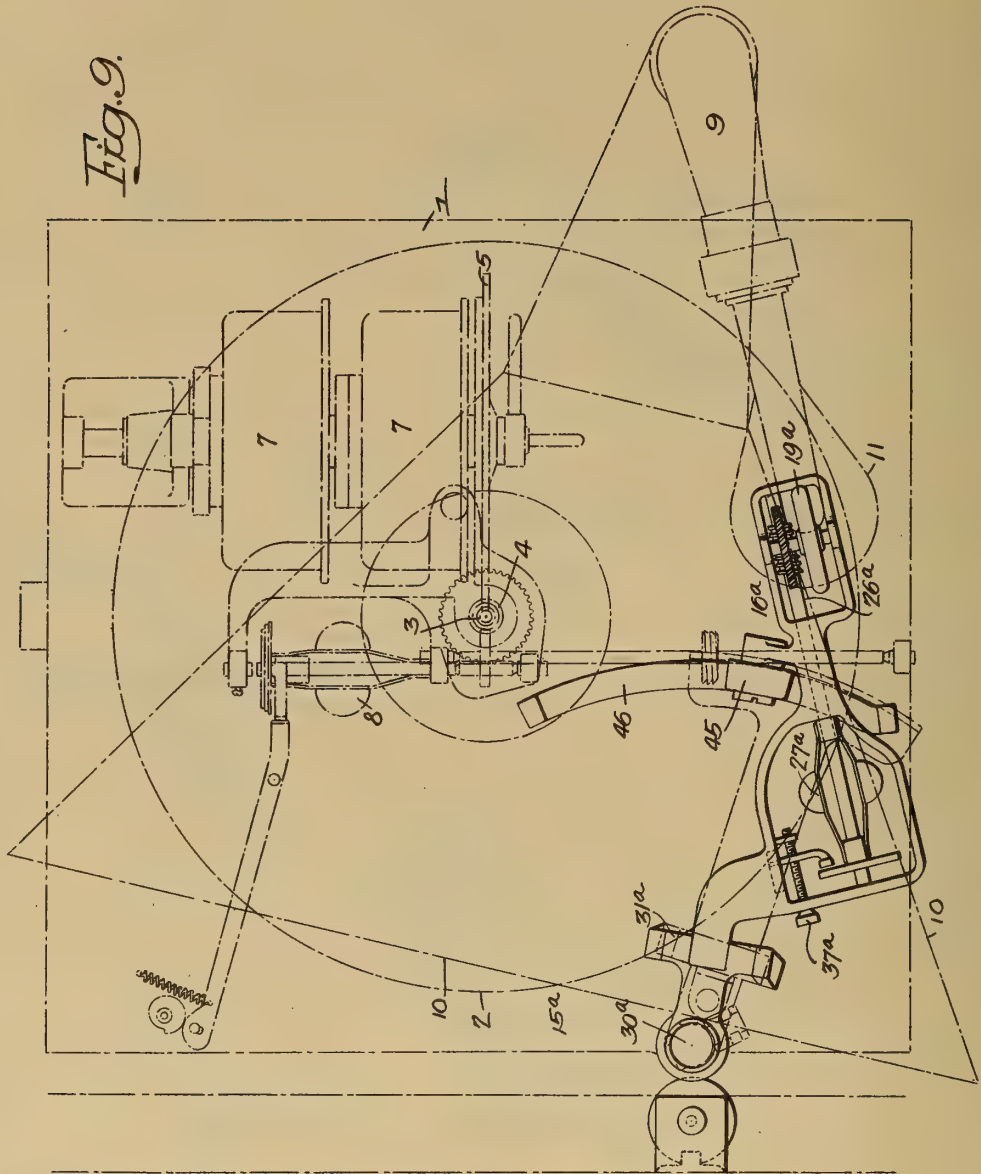
Fig. 12.



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by his Attorneys—
Howson & Howson

1,216,222.

7 SHEETS—SHEET 6.



Inventor:-
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J. F. H. FECHTENBURG.
SPEED REGULATING DEVICE FOR TALKING MACHINES.
APPLICATION FILED AUG. 3, 1916.

1,216,222.

Patented Feb. 13, 1917.
7 SHEETS— SHEET 7.

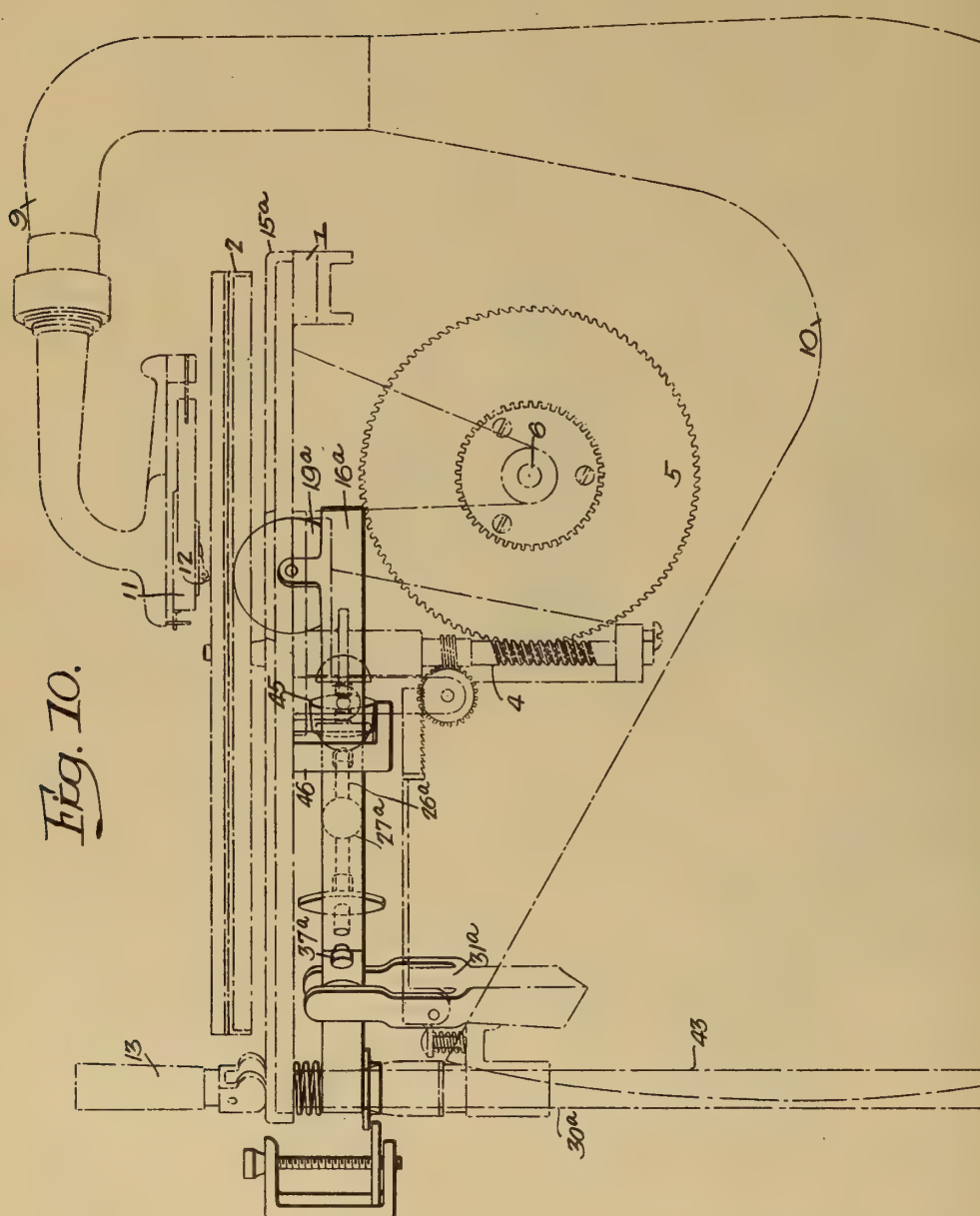


Fig. 10.

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Hosmer & Brown

UNITED STATES PATENT OFFICE.

JÖRGEN F. H. FECHTENBURG, OF PHILADELPHIA, PENNSYLVANIA.

SPEED-REGULATING DEVICE FOR TALKING-MACHINES.

1,216,222.

Specification of Letters Patent.

Patented Feb. 13, 1917.

Application filed August 3, 1916. Serial No. 112,982.

To all whom it may concern:

Be it known that I, JÖRGEN F. H. FECHTENBURG, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain improvements in Speed-Regulating Devices for Talking-Machines, of which the following is a specification.

My invention relates to certain improvements in talking machines, particularly of the disk type in which a disk is carried by a turn table which travels under a tone arm.

One object of my invention is to increase the capacity of machines of this type by regulating the speed of the turn table so that the surface speed at the point of contact of the stylus with the record will be the same throughout the entire width of the turn table.

A further object of the invention is to provide a friction speed regulator for accomplishing the above purpose.

A still further object of the invention is to arrange this friction speed regulator so that when the tone arm is raised for the purpose of changing a record the friction speed regulator is lowered so as to allow the turn table to be entirely free of the mechanism.

In the accompanying drawings:

Figure 1, is a plan view showing a talking machine of the "Edison" type in dotted lines and my improvement in full lines;

Fig. 2, is a side view of the same;

Fig. 3, is an end view;

Fig. 4, is a plan view of my improved mechanism detached from the talking machine;

Fig. 5, is an end view of the mechanism;

Fig. 6, is a side view of the mechanism;

Fig. 7, is a perspective view of one of the bearings;

Fig. 8, shows a nut for holding the turn table onto the spindle;

Fig. 9, is a plan view illustrating a modification of my invention;

Fig. 10, is a side view of the same, and

Figs. 11 and 12 are views of modifications of my invention.

1 is the frame of the phonograph. 2 is the turn table mounted on a pivot 3 and driven by the driving mechanism 4 and 5 consisting of a worm and worm wheel, the wheel being mounted on a shaft 6 of a motor 7. 8 is a governor for controlling the speed of the turn table and this governor is geared to the spindle by a worm and worm wheel connection. 9 is the tone arm. 10 is the

horn. 11 is the sound box or reproducer on the end of the tone arm carrying the stylus 12 which travels in the groove of the disk or record. 13 is the handled cam for depressing the reproducer so as to bring the stylus into active position. All of this mechanism is common to the type of talking machine mentioned above.

The turn tables of disk talking machines are always driven at the same rate of speed, consequently the periphery of the turn table turns at a greater surface speed than that portion near the center and the impression on the disk is coarser at the periphery than at the center to allow for this change of speed.

By my invention, I so govern the speed of the turn table that the surface speed is always the same, consequently a greater length of record can be accommodated with a given diameter of disk than can be accommodated by the ordinary method because I provide means for controlling the surface travel of the turn table. Therefore, the surface speed of the turn table and the disk carried thereby is the same at the outer edge as it is near the center. This I accomplish in the following manner:

Pivotaly mounted at 14 on the support- ing plate 15 of the machine is a frame 16 having bearings 17 for a squared shaft 18 on which slides the pressure roller 19 having a rounded bearing surface which rests against the under side of the turn table 2. At the opposite end of the shaft 18 from the roller 19, in the present instance, is a gear wheel 20 which meshes with a pinion 21 which, in turn, meshes with a pinion 22 on a shaft 23 carrying a gear wheel 24, which meshes with a pinion 25 on a shaft 26 on which is a governor 27 of a construction usual in this type of machine. This governor can be regulated in the same manner as the ordinary talking machine governor now in use. An oil guard 50 is located between the roller 19 and the governor, as shown, to prevent the governor splashing oil on the wheel.

The frame 16 has an extension 28 having a perforation 29 through which passes the pivot pin 30 which is secured to the plate 15 of the machine and between the head of this pin and the extension is a spring 31 tending to lift the plate and hold the roller against the bottom of the turn table 2. The position of the roller 19 on the shaft 18 is controlled

by the horn 10. 32 is an arm secured to the horn and has an adjustable extension 32^a held by a set screw 33. This extension enters a slot 34 in the portion 35 of the depending bearing 36, which is arranged to receive the trunnions of the roller 19.

By this construction when the horn moves on its pivot so as to carry the stylus over the record, the roller 19 is moved with it so that it always assumes a correct position in respect to the stylus. The governor can be set to any position by an adjusting screw 37 so as to regulate the speed of the shaft 18 and its roller 19. Thus, as the stylus travels from the periphery toward the center the amount of retardation is lessened, and, consequently, a much longer record can be produced on the disk than in the present type of machine.

When it is desired to move the friction roller 19 out of action, I tilt the frame on its pivot 14 by a lever 38, which is pivoted at 39 to the plate 15 and has a short arm which extends over the projection 28 of the frame 16. At the outer end of the arm of the lever is a screw 40 on which is a nut 41 which rests on a bracket 42 secured to the casing of the machine, so that on turning this nut in one direction the arm carrying the screw 40 is raised while the other arm is depressed, forcing the frame 16 down against the pressure of the spring 31 and drawing the roller 19 away from the turn table.

I also provide means for releasing the turn table from the control of the roller 19 when the handled cam 13 is turned on its pivot to raise the stylus. The horn 10 carrying the tone arm and stylus is mounted on a vertical pivot 43, and the vertical position of the parts carried by the horn is controlled by the cam lever 13 which, when turned, will bear upon the plate 15, lifting the horn and the portions connected thereto so that the stylus will be clear of the disk.

Secured to the vertical pivot 43 is a collar 44 which is located under the lever 38, so that when the cam lever 13 is turned to raise the pivot 43 and the stylus the lever 38 will be turned on its pivot 39 and will depress the frame 16 so as to withdraw the roller 19 from contact with the under side of the turn table.

In order to prevent the turn table from lifting off of its driving spindle 4, I provide a nut 2^a, (Fig. 8) which is adapted to a threaded extension 4^a of the spindle and the flange of the nut rests in a recess in the turn table. By this construction, the turn table is held against vertical movement on the spindle.

In Figs. 9 and 10 I have illustrated a modification in which the wheel 19^a is mounted on the frame 16^a, which is pivoted at 30^a, and the frame is moved by an arm 31^a on the horn. The wheel 19^a drives the

governor shaft 26^a through a right angled gear or worm gear, as shown in Fig. 9, and the governor 27^a is controlled by an adjusting screw 37^a. On the frame 16^a is a wheel 45 which travels on a segmental track 46 secured to the under side of the frame 15^a. The pivot 30^a is the same pivot on which the horn is mounted so that the bearing portion of the roller 19^a is always directly under the stylus irrespective of the position of the horn.

In some instances, the roller instead of being a retarding roller may be a driving roller as at 19^a for driving the turn table, as shown in Fig. 11, the motor, in this case, being geared directly to the shaft on which the wheel is mounted. The turn table is then driven by friction from the underside instead of being driven from the center bearing as in the drawings.

In some instances, as shown in Fig. 12, the disk may overhang the turn table which may be simply a comparatively small hub, as at 26; in this case the roller will bear upon the disk which, in fact, becomes the turn table.

While my invention is particularly adapted for use in records in which the reproductions are all of the same length irrespective of the position of the record on the disk, by moving my improved mechanism out of contact with the turn table the ordinary records can be used.

I claim:—

1. The combination in a talking machine, of a turn table; a horn; a sound box having a stylus carried thereby; a roller bearing upon the turn table; means for causing the roller to move with the horn, and means for regulating the speed of the roller so that the surface speed of the disk carried by the turn table at the stylus will be the same throughout the length of the record.

2. The combination in a talking machine, of a turn table; a reproducer; a roller bearing against the turn table; means for driving the roller at a given speed, and means for moving the roller in unison with the movement of the reproducer.

3. The combination in a talking machine, of a turn table; means for holding the turn table against vertical movement; a tone arm, sound box and stylus located above the turn table; a frame located under the table; a roller carried by the frame and bearing against the under side of the turn table; means for driving the roller at a given speed, and means for moving the roller under the turn table in unison with the movement of the stylus across the table.

4. The combination in a talking machine, of a turn table; a tone arm, sound box and stylus; a frame; a roller carried by the frame and bearing against the under side of the turn table; means for driving the

roller at a given speed; and means for moving the roller under the turn table in unison with the movement of the stylus.

5 5. The combination in a talking machine, of a turn table; a tone arm; a sound box and stylus; a frame pivotally mounted on the under side of the turn table and having a roller; a shaft; a roller mounted on the shaft and arranged to bear on the under
10 side of the turn table; a governor for regulating the speed of the roller, and means connecting the frame with the tone arm so that the two will travel in unison toward and from the center of rotation of the turn
15 table, the roller and its governor regulating the speed of the turn table.

6. The combination in a talking machine, of a turn table; a tone arm, a sound box mounted thereon; a frame pivoted under the
20 turn table; a shaft mounted thereon; a roller on the shaft bearing against the under side of the turn table; a governor geared to the roller so as to regulate its speed, and means for moving the roller into and out of con-
25 tact with the turn table.

7. The combination in a talking machine,

of a turn table; a pivoted horn; a tone arm; a sound box thereon; a frame pivotally mounted under the turn table; a shaft
mounted on the frame; a governor geared 30 to the shaft; means for regulating the governor; a roller arranged to turn with but to move longitudinally on the shaft, and means for controlling the position of the roller
on the shaft, said means being connected to 35 the pivotally mounted horn.

8. The combination in a talking machine, of a pivoted turn table; a pivoted horn carrying at its upper end a tone arm; a sound box extending over the turn table; 40 means for driving the turn table at a given speed; a roller bearing against the under side of the turn table; a governor controlling the speed of the roller; a frame carrying the roller; means for traversing 45 the roller under the turn table in unison with the movement of the sound box over the turn table, the said roller and its governor retarding the turn table so that the surface speed at the reproducer will be the same 50 throughout the diameter of the turn table.

JÖRGEN F. H. FECHTENBURG.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

ANNOTATOR FOR COMMERCIAL
PHONOGRAPHS,

1,216,232-----M.L.Hunter & A.B.Church,
Patented-February 13th, 1917.
Filed-September 15th, 1915.

M. L. HUNTER & A. B. CHURCH.
 ANNOTATOR FOR COMMERCIAL PHONOGRAPHS.
 APPLICATION FILED SEPT. 15, 1915.

1,216,232.

Patented Feb. 13, 1917.
 6 SHEETS—SHEET 1.

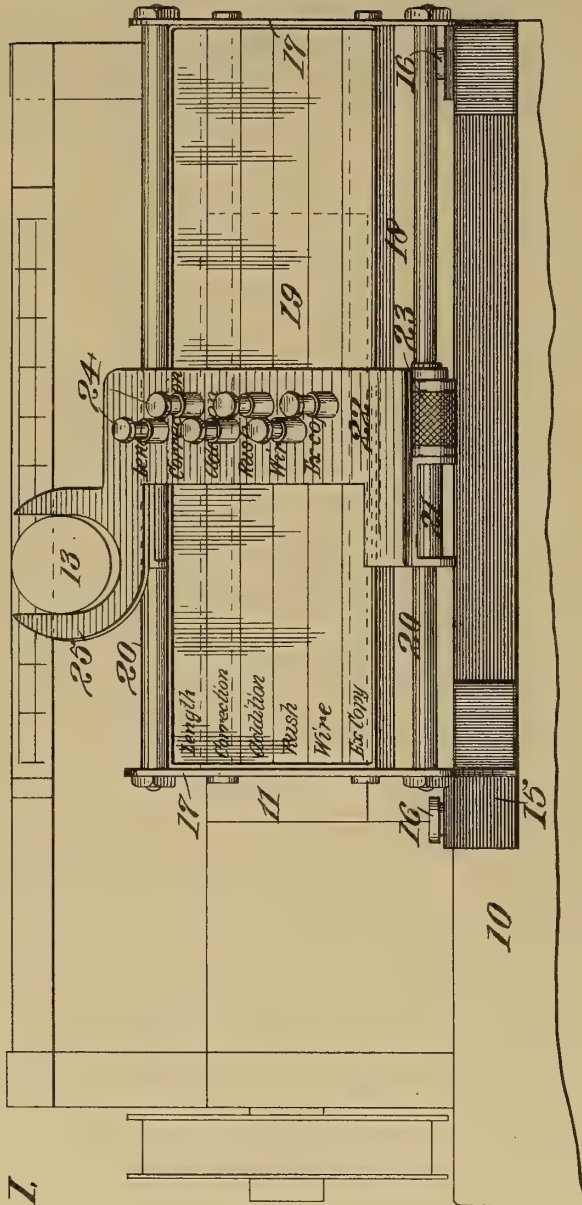


Fig. 1.

WITNESSES:

Charles Reckles
Thos. Eastberg

Fig. 2.

Length	: 26	:	:	:	:	:
Correction	:	:	:	:	:	:
Addition	:	:	:	:	:	:
Rush	:	:	:	:	:	:
Wire	:	:	:	:	:	:
Ex. Copy	: 26	:	:	:	:	:

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 APPLICATION FILED SEPT. 15, 1915.

1,216,232.

Patented Feb. 13, 1917.
 6 SHEETS—SHEET 2.

Fig. 3.

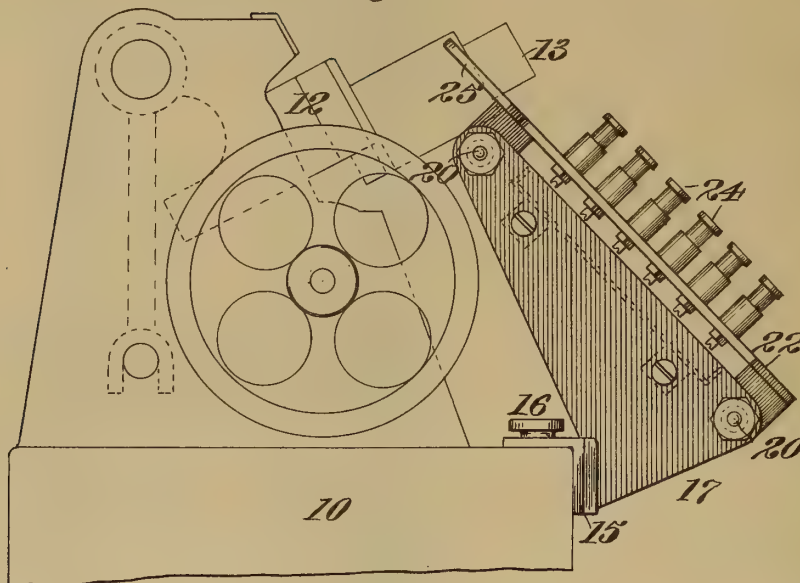


Fig. 4.

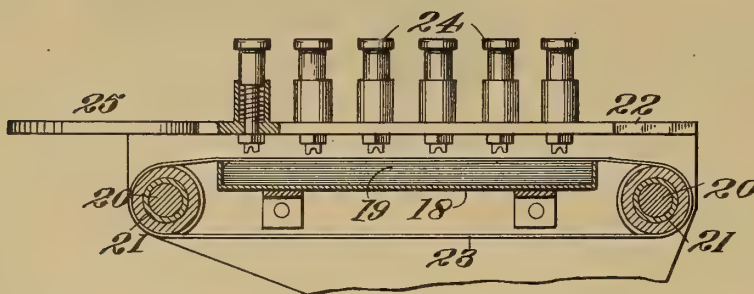
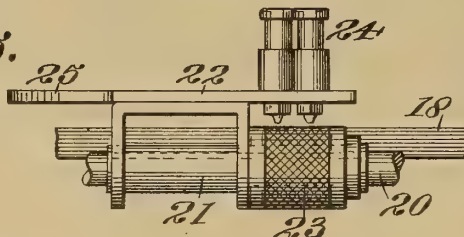


Fig. 5.



WITNESSES:

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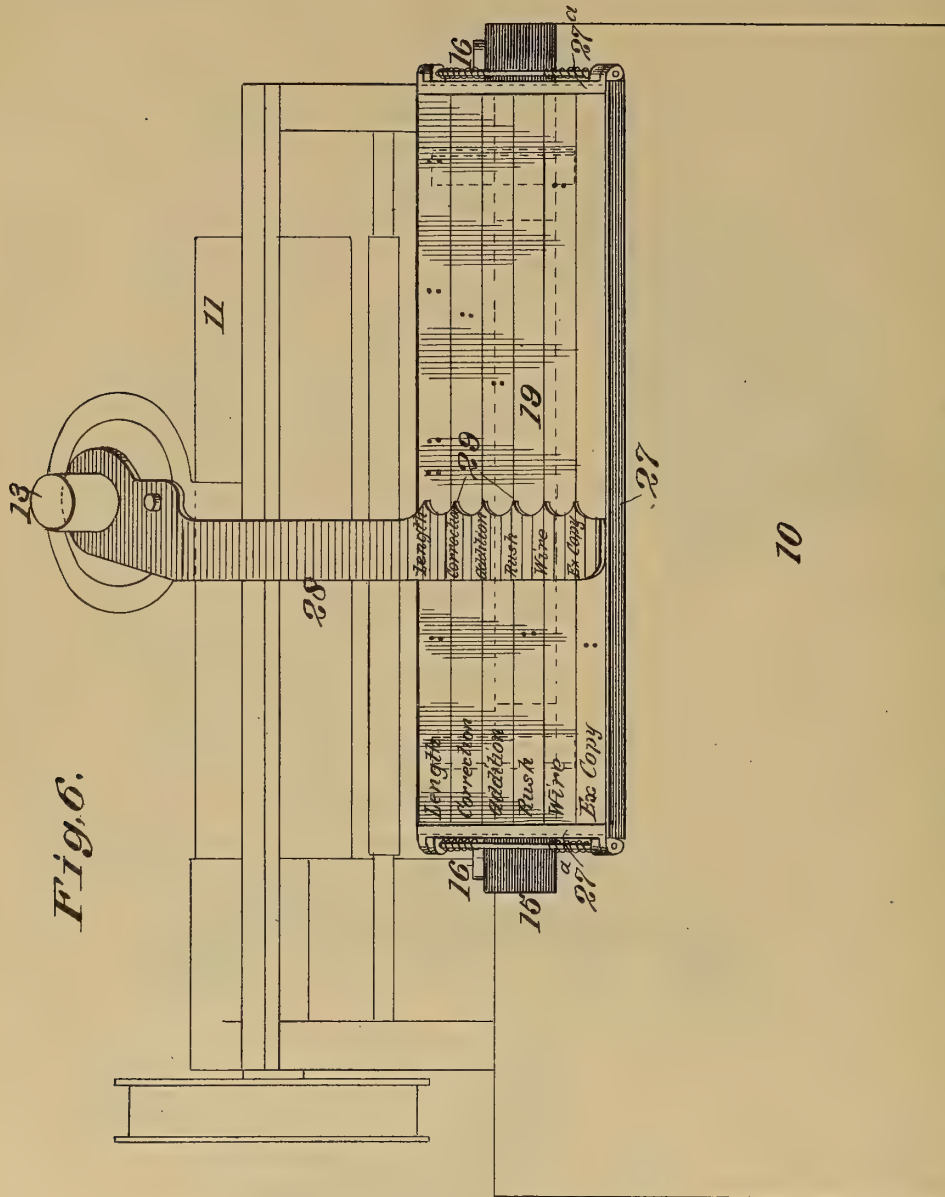
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 APPLICATION FILED SEPT. 15, 1915.

1,216,232.

Patented Feb. 13, 1917.

6 SHEETS—SHEET 3.



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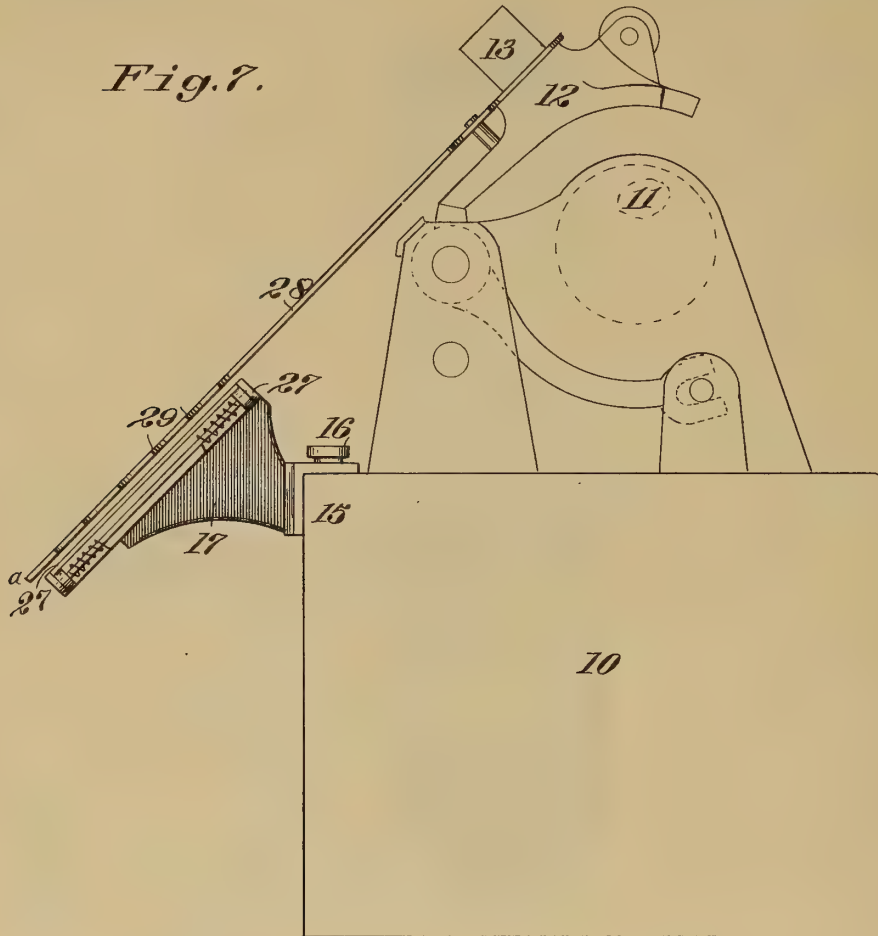
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APPLICATION FILED SEPT. 15, 1915.

1,216,232.

Patented Feb. 13, 1917.
6 SHEETS—SHEET 4.

Fig. 7.



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 APPLICATION FILED SEPT. 15, 1915.

1,216,232.

Patented Feb. 13, 1917.

6 SHEETS—SHEET 5.

Fig. 8.

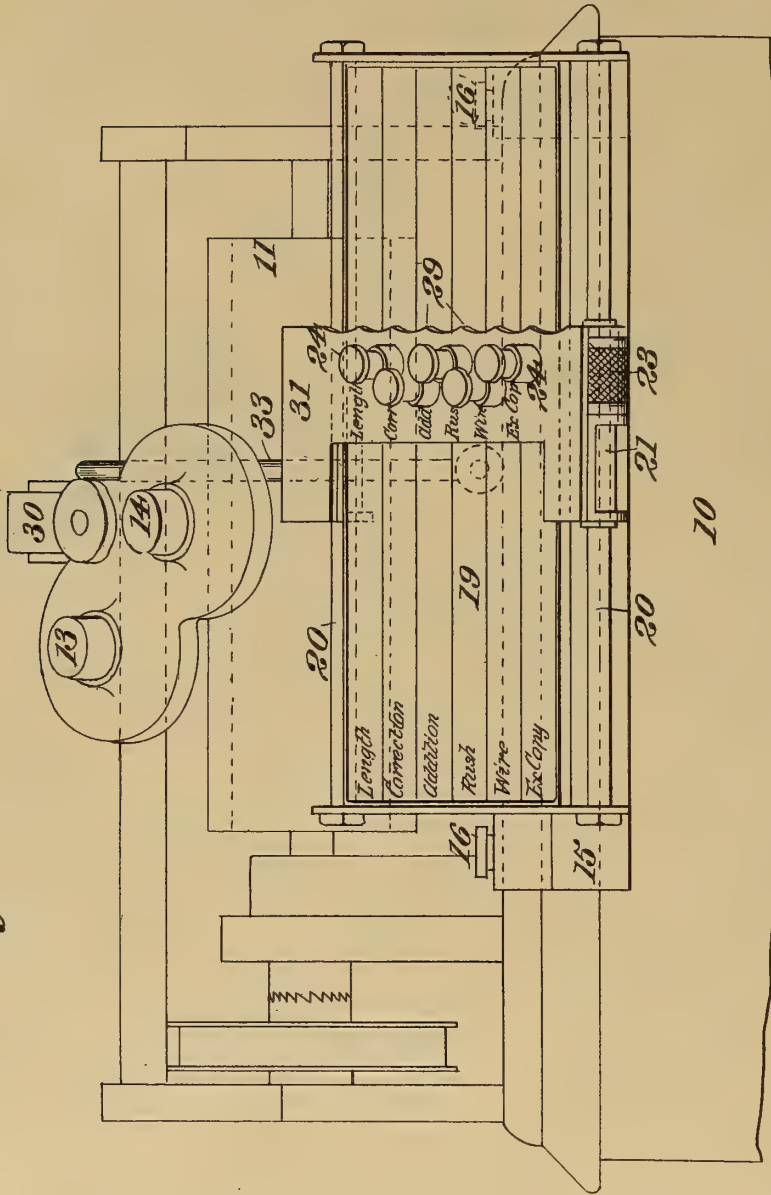
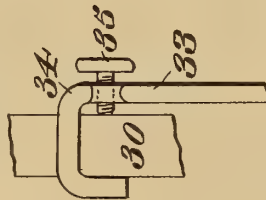


Fig. 9.



WITNESSES:

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 APPLICATION FILED SEPT. 15, 1915.

1,216,232.

Patented Feb. 13, 1917.
 6 SHEETS—SHEET 6.

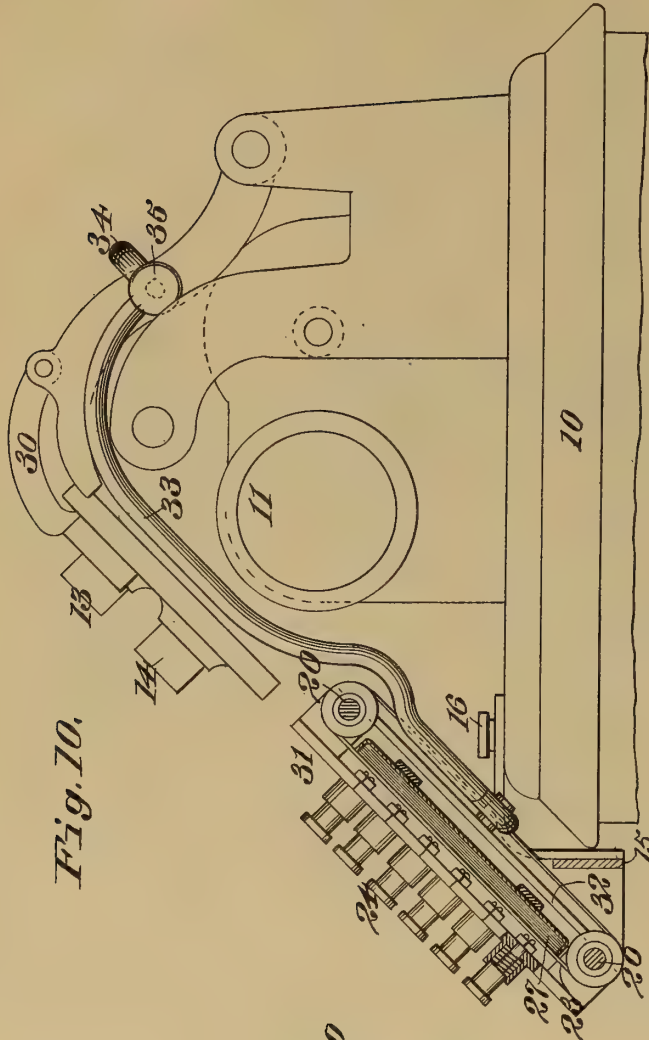


Fig. 10.

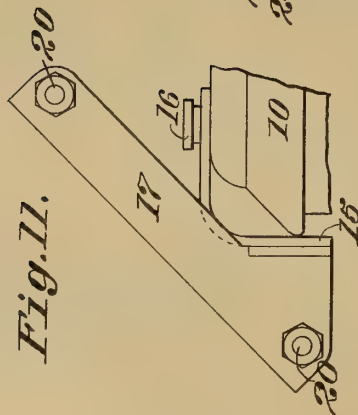


Fig. 11.

WITNESSES:

Charles Rickles
Thos. Eastberg

Length	:	:	:	:	:	26	:
Correction	:	:	:	:	:	26	:
Addition	:	:	:	:	:	:	:
Rush	:	:	:	:	:	19	:
Wire	:	:	:	:	:	:	:
Ex. Copy	:	:	:	:	:	:	:

INVENTORS
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UNITED STATES PATENT OFFICE.

MARTHA L. HUNTER AND ALBERT B. CHURCH, OF SAN FRANCISCO, CALIFORNIA.

ANNOTATOR FOR COMMERCIAL PHONOGRAPHS.

1,216,232.

Specification of Letters Patent.

Patented Feb. 13, 1917.

Application filed September 15, 1915. Serial No. 50,780.

To all whom it may concern:

Be it known that we, MARTHA L. HUNTER and ALBERT B. CHURCH, citizens of the United States, residing in the city and county of San Francisco and State of California, have invented new and useful Improvements in Annotators for Commercial Phonographs, of which the following is a specification.

This invention relates to commercial phonographs.

The object of this invention is to provide, in connection with a commercial phonograph, means movable by the traveling head thereof to traverse a memo sheet and operable by the dictator to mark upon said sheet various instructions applying to the matters contained in the phonograph record, and means whereby, from said memo sheet containing the instructions, the transcriber may locate upon the record the position of the matters to which said instructions apply.

Heretofore it has been proposed to supply a specially printed sheet, properly ruled and provided with stock phrases, said sheet to receive upon its face penciled marks made by the dictator to convey the necessary information relative to the matters in the record for the convenience of the transcriber. Great difficulty has been encountered by users of this memo sheet in properly marking it and also in locating from the marks thereon the position in the phonograph record of the matters to which such marks apply.

In the present invention this objection has been overcome by the provision of mechanical means for carrying on these operations, whereby greater precision and accuracy are obtained.

In carrying out the object of this invention we employ a holder, fastened to the box of the phonograph, to receive sheets of memo paper; a marking device movable with the traveling head of the phonograph to traverse the memo sheet, said marking device embodying keys for printing upon the sheet the necessary instructions; and means also movable with the traveling head of the phonograph to indicate in advance to the transcriber the exact position and location on the phonograph record of the matters to which the marks on the sheet apply.

Two forms which our invention may assume are exemplified in the following de-

scription and illustrated in the accompanying drawings, in which—

Figure 1 shows a front elevation of the attachment applied to a dictating machine.

Fig. 2 shows a view of the memo sheet employed.

Fig. 3 shows a side elevation of the device illustrated in Fig. 1.

Fig. 4 shows a cross sectional view of the holder and marking device employed in connection with a dictating machine.

Fig. 5 shows a detail view of the sliding connection between the marking device and the holder, illustrating also the inking ribbon and marking keys in end elevation.

Fig. 6 shows a front elevation of the transcribing attachment applied to a phonograph.

Fig. 7 shows a side elevation of the device illustrated in Fig. 6.

Fig. 8 shows a front elevation of a combined dictating and transcribing attachment applied to a phonograph embodying both the dictating and transcribing elements.

Fig. 9 shows a detail view of the connection employed in the device illustrated in Fig. 8 between the traveling head and indicator device.

Fig. 10 shows a side elevation of the device illustrated in Fig. 8.

Fig. 11 shows a detail view, illustrating the method of detachably connecting the holder to a phonograph box.

In the drawings, a phonograph is shown comprising a box 10, a cylindrical record 11, and a movable head 12. The latter in one case (Figs. 1 and 3) is provided with a recorder 13 and in the other case (Figs. 6 and 7) with a reproducer 14. Attached to the front side of the box, by suitable brackets 15 and thumb-screws 16, is a holder 17 (see Figs. 1 and 3) to receive a tray 18 designed to contain a pad of memo sheets 19, one of which is shown in Fig. 2. A pair of rods 20 extend across the holder and upon them is slidably mounted, by means of bearings 21, a marking device 22, carrying at its under side an endless ribbon 23 running over said bearings 21 and encircling the tray, said ribbon being designed to contain ink. Included in the marking device is a series of spring-pressed keys 24, spaced apart in a vertical direction and positioned to contact with the upper run of the ribbon, when depressed, to thereby mark upon the exposed sheet of paper in the tray.

A bifurcated head 25, on the marking device, embraces the recording attachment 13 of the phonograph, and thus as the phonograph is operated the marking device is moved across the holder simultaneously with the movement of the recording device, traversing in this way the entire length of the memo sheet 19. The form of connection between the marking device and the recording attachment permits raising and lowering of the latter without interference.

Each key 24 is labeled with some such stock phrase as "length", "correction", "addition", etc., and the memo sheet 19 may be ruled and printed accordingly, or may be merely a blank slip of paper. Depressing a key 24 will imprint upon the sheet 19 a mark, such as shown at 26, on said sheet which will indicate to the transcriber in advance some special instruction concerning the dictation. For instance, the "correction" key indicates any change made in the dictation; the "rush" key indicates special dictation which it is desired to be transcribed in advance of the others; the "wire" key immediately locates any telegrams so that they may be transcribed without delay. The remaining keys are believed to be self-explanatory.

The sheet 19 thus marked is a panorama of the contents of the phonograph record. It readily indicates whether a letter should be single or double spaced by reason of the length of the communication; the location of letters and telegrams which should be transcribed first; letters of which extra copies are required, thereby obviating double work in rewriting; additions, which otherwise would require the time for replacing the letter in the typewriter; and especial corrections which are annoying, necessitating erasures, spoiling the sheet, or actually rewriting the letter and the loss of the time and stationery.

When the phonograph record is completed, the operator removes the same and inserts the sheet of memo paper corresponding thereto within the cylinder, and when transferring the record to the transcribing machine, the memo sheet is introduced in a holder 27 (see Figs. 6 and 7), detachably connected to the box 10 in a manner similar to the holder 17 and corresponding in position thereto. The holder 27 comprises a base plate, on the ends of which are spring-pressed clips 27^a for retaining the sheet in a flattened position thereon. Rigidly connected to the reproducing device 14 of the transcribing machine is an indicator plate 28 positioned to travel across the holder and provided with indicating notches 29 labeled to correspond with the keys of the marking device. Thus the operator is enabled to locate the position of the various matters in the record to which the marks on the memo

sheet apply merely by sliding the reproducing device, to which the indicator plate is attached upon the record, until the notches on said plate register with the various marks on the paper. Now, these marks, while here shown in the form of dots, may be of any nature or may be the printed word itself.

In Figs. 8 and 10 is shown a different form of dictating machine, in which the recorder 13 and reproducer 14 are embodied in a single head 30. For the purpose of attaching our device to this machine, a special plate 31 is employed embodying both keys 24 and notches 29. A connecting plate 32 extends from bearing to bearing beneath the plate 31, and rigidly connected thereto is an arm 33 extending up over the cylinder and detachably connected, by a clip 34 and thumb screw 35, to the arm of the traveling head 30. The recorder and reproducer being pivoted to the head 30 are free to be swung into position when a connection of this form is used. In this modification the operation is the same as in the other, but the construction is simpler in that two devices are combined in one.

Other modifications may be employed without departing from the spirit of our invention as disclosed in the appended claims.

Having thus described our invention, what we claim and desire to secure by Letters Patent is—

1. The combination with a commercial phonograph having a rotatable element and a traveling element, of a memo sheet holder, mechanical means for marking instructions upon a sheet within said holder when dictating, regarding the matters contained in the phonograph record, and a yoke embracing a projection on the traveling element and connected rigidly with the marking means for moving the latter across the sheet in said holder.

2. The combination with a commercial phonograph, having a rotatable element and a traveling element, of a memo sheet holder, and a marking device movable with the traveling element of the phonograph and traversing the sheet in the holder, whereby the dictator may mark upon said sheet a variety of instructions pertaining to the phonograph record, said marking device comprising an upwardly and forwardly inclined plate at the front of the phonograph and a series of depressible printing keys thereon arranged in staggered relation for compactness.

3. In combination with a commercial phonograph having a rotatable element and a traveling element, a holder detachably connected to the box thereof, a tray removably received in said holder and adapted to receive a pad of memo sheets, and a marking device comprising a plate and a series of printing keys thereon, said plate being con-

5 nected with the traveling element of said
phonograph and slidably mounted on said
holder to move across said sheets, whereby
the operator may imprint upon the exposed
sheet various instructions applying to the
matters contained in the record of said
phonograph.

10 4. In combination with a commercial
phonograph having a rotatable element and
a traveling element, a holder detachably
connected to the box thereof and adapted to re-
ceive a memo sheet, rods extending across
said holder, and a marking device slidable
on said rods and connected to the traveling
15 element of the phonograph, said marking
device being provided with means whereby
the operator may imprint upon the sheet
various instructions applying to the matters
contained in the phonograph record.

20 5. In combination with a commercial
phonograph having a rotatable element and
a traveling element, a holder attached there-
to, a tray in said holder adapted to receive a
memo sheet, rods extending across said
25 holder, a plate slidable on said rods, sleeve
connections between said plate and rods, a
connection between said plate and the travel-

ing element, a series of depressible marking
keys on said plate, whereby the operator may
imprint various instructions on the sheet ap- 30
plying to the matters contained in the phono-
graph record, and an endless inking ribbon
running over said sleeves and encompassing
said tray to coact with the marking keys.

6. The combination with a commercial 35
phonograph having a rotatable element and
a traveling element, of a holder detachably
connected thereto and adapted to receive a
memo sheet, a plate slidably mounted on said
holder and having a connection with the 40
traveling element to move across said holder,
said plate having a series of printing keys
to mark upon the sheet and a series of point-
ers on its front edge to correspond with the
positions of said keys. 45

In testimony whereof we have hereunto
set our hands in the presence of two sub-
scribing witnesses.

MARTHA L. HUNTER.
ALBERT B. CHURCH.

Witnesses:

JOHN H. HERRING,
W. W. HEALEY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

GIGAPHONE PATENT.
MULTIPLE HORN PHONOGRAPH,
#1,216,500-----J. Roever,
Patented-February 20th, 1917.
Filed-July 12th, 1915.
Renewed-July 14, 1916.

J. ROEVER.

MULTIPLE HORN PHONOGRAPH.

APPLICATION FILED JULY 12, 1915. RENEWED JULY 14, 1916.

1,216,500.

Patented Feb. 20, 1917.

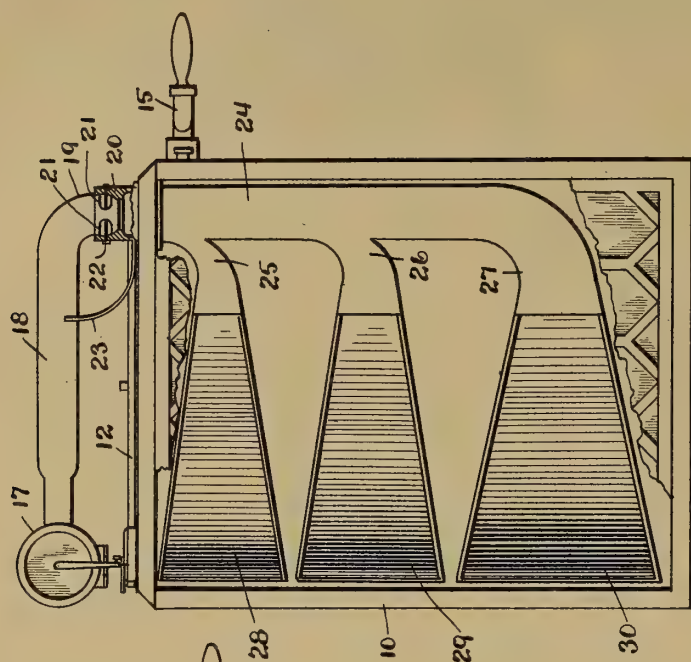


Fig. 1.

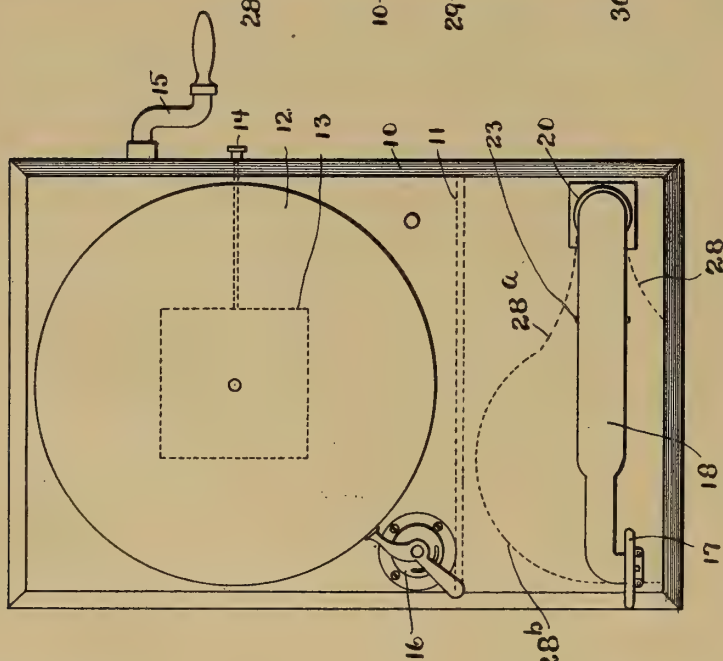


Fig. 2.

Witness
Arthur J. Damm,

Julius Roever Inventor
By his Attorney
W. B. Hutchinson.

UNITED STATES PATENT OFFICE.

JULIUS ROEVER, OF NEW YORK, N. Y., ASSIGNOR TO ROEVER PATENT COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

MULTIPLE-HORN PHONOGRAPH.

1,216,500.

Specification of Letters Patent.

Patented Feb. 20, 1917.

Application filed July 12, 1915, Serial No. 39,245. Renewed July 14, 1916. Serial No. 109,404.

To all whom it may concern:

Be it known that I, JULIUS ROEVER, a citizen of the United States, and a resident of the city of New York, county of Queens, and State of New York, have invented a new and useful Improvement in Multiple-Horn Phonographs, of which the following is a full, clear, and exact description.

My invention relates to improvements in phonographs of the multiple horn type. The object of my invention is to produce a phonograph of the disk record type, in which the tone arm delivers into an extension having a plurality of outlets of gradually increasing size, each outlet connecting with a horn. I have found that by graduating and multiplying the outlets and horns in this way, I get a much better tone production, and also a greater volume. The different sizes of outlets seem to take up different tones to better advantage so that as a result practically all the tones produced and discharged through and amplified in one horn or the other. Furthermore I find that by arranging these horns in a vertical series at one side of the case or cabinet which contains them, with the tone arm and reproducer above them, and with the other parts of the machine at one side and in front of the motor, I get a very nice arrangement which leaves the mechanism where it can be easily reached, and provides convenient filing space for the records. Another object of my invention is to make the connection between the tone arm and its extension of a simple nature by which a single joint permits the tone arm to have a free lateral, vertical or other movement, and to construct the joint so that it does not interfere with the ready passage of sound waves to the horns.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar reference characters indicate corresponding parts in all the views.

Figure 1 is a plan view of a machine showing my improvements, and

Fig. 2 is a front view of the machine with the screen broken away.

The machine is provided with a case or cabinet 10 which can be of any approved design, and which is preferably provided with a vertical partition 11, separating the motor part from the horn portion of the

machine as shown. The machine has at the top a rotary record table 12, and is driven by a motor 13 beneath, this being shown in dotted outline. I have also shown the usual accessories, to wit, a regulator 14, motor winding handle 15, and stopping and starting mechanism 16.

The machine is provided with a suitable reproducer 17 which connects with a generally horizontal tone arm 18 through which the sound waves are carried as usual, and this tone arm is bent downward at its pivoted extremity as shown at 19, forming a neck which is rounded off at the extremity and enters a socket 20 which is correspondingly rounded. The bearing or spherical portion at the end of the neck 19 is slotted laterally nearly all around as shown at 21, and a pin 22 extends through the socket 20 and the end of the tone arm, passing through the slotted portions 21. This leaves the arm perfectly free to move in any direction, and the sound waves are not scattered because the slots 21 lie within the socket 20. A spring arm 23 is arranged near the tone arm so that when the latter is not in use it can rest in the spring arm or bracket.

Leading downward into the case 10 near one end of the machine, is an extension 24 of the tone arm, which has a plurality of outlets 25, 26 and 27 of graduated sizes, and connecting respectively with horns 28, 29 and 30, leading to one side of the casing, which as usual in such constructions is left open or simply screen covered so that the sound waves will not be materially interfered with. It will be noticed that the horns are on one side of the partition 11, while the other side is left free for the motor and for record filing space.

By having the plurality of horns and connections as shown, and by making the outlets from the member 24, that is the inlets to the respective horns, of graduated sizes, I get a very large volume of sound and pick up all the desirable tones from the reproducer 17.

It will be seen that the arrangement is very simple and accessible, and it will be noted also that the connection between the member 24 and the tone arm is such as to permit the greatest freedom of movement, and that the joint is of a very simple construction.

Referring to Fig. 1, it will be noticed that I also have a peculiar shape for each horn.

The horn 28, for instance, tapers gradually till about the point 28^a, where it is given a deep, nearly semi-circular rounded shape, making a full chamber in which the sound waves are resonated, while the mouth is directly in front of the enlarged bell-like part 28^b.

It will also be noted that while the horn or horns has the intake at one side, the mouth is directly in front of the motor, and by having the horns in a narrow space or chamber in front of the motor, I still get all the volume required because vertically there is space for the emission of a great volume of sound.

I claim:—

1. A phonograph comprising a casing having a vertical partition forming two chambers, one being located in the front part of the casing, a record table above one chamber, a motor below said table to drive the same, said motor being located in the back chamber of the casing, a tone arm arranged over the front chamber and adapted to swing over the record table, a vertically arranged hollow member at one end of the front chamber having a connection with the tone arm, and a plurality of horns in the front chamber spaced apart from each other and

vertically arranged the horns each having a free open connection with the said vertical member the connections being of different sizes.

2. A phonograph comprising a casing, a vertically arranged hollow member contained wholly within the casing, a series of horns vertically spaced apart and connected with the hollow member through openings of different sizes, reproducing mechanism at the top of the casing, and a tone arm connecting the reproducing mechanism with said hollow member.

3. A phonograph comprising a casing, a vertically arranged hollow member contained wholly within the casing, a series of horns vertically spaced apart and connected with the hollow member through openings of different sizes, reproducing mechanism at the top of the casing, a tone arm connecting the reproducing mechanism with said hollow member, and a universal joint connection between the tone arm and said hollow member.

JULIUS ROEVER.

Witnesses:

WARREN B. HUTCHINSON,
ARTHUR G. DANNELL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

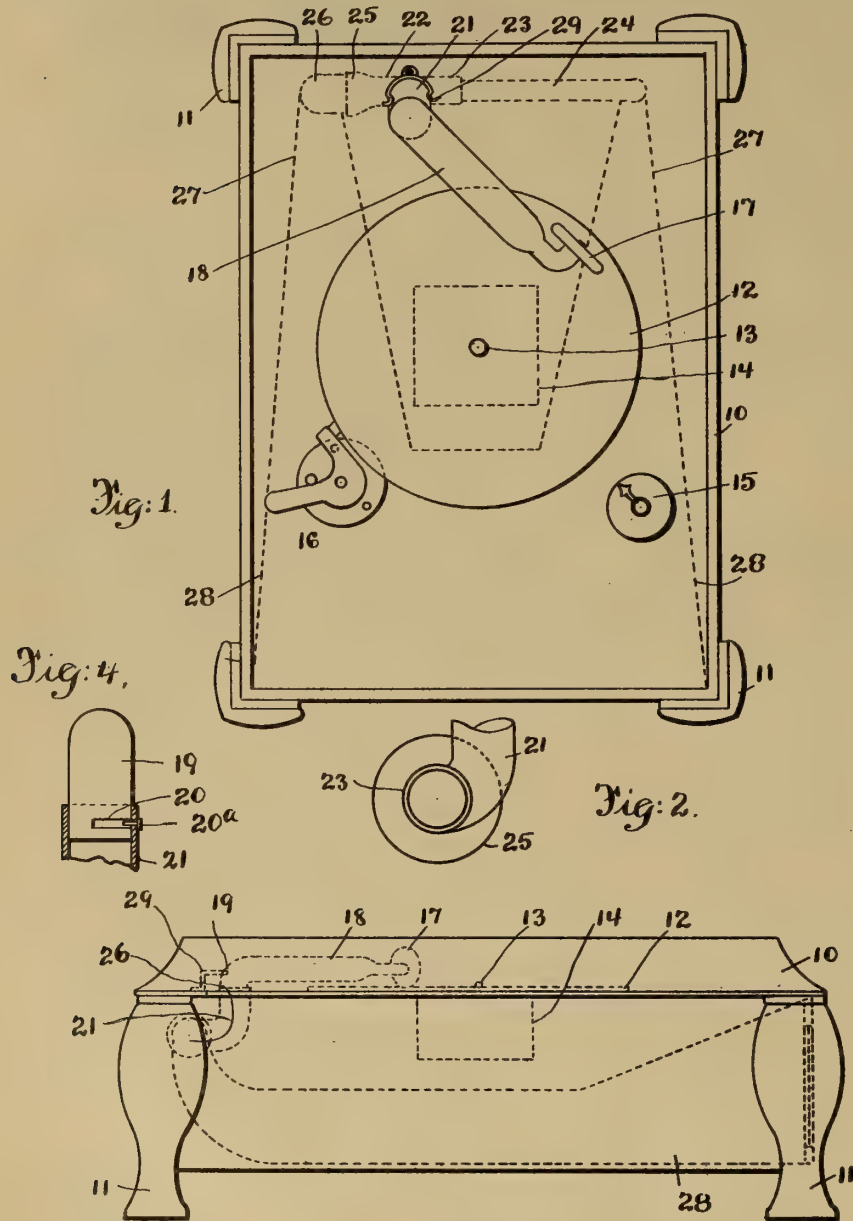
DIVIDED HORN PHONOGRAPH,
#1,216,501-----J. Roever,
Patented-February 20th, 1917.
Filed-July 12th, 1915
Renewed-July 14th, 1916.

J. ROEVER.
DIVIDED HORN PHONOGRAPH.

APPLICATION FILED JULY 12, 1915. RENEWED JULY 14, 1916.

1,216,501.

Patented Feb. 20, 1917.



Witnesses:
Arthur D. Danwell.

Fig. 3.
Julius Roever, Inventor.
By his Attorney,
W. D. Hutchinson.

UNITED STATES PATENT OFFICE.

JULIUS ROEVER, OF NEW YORK, N. Y., ASSIGNOR TO ROEVER PATENT COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

DIVIDED-HORN PHONOGRAPH.

1,216,501.

Specification of Letters Patent.

Patented Feb. 20, 1917.

Application filed July 12, 1915, Serial No. 39,246. Renewed July 14, 1916. Serial No. 109,403.

To all whom it may concern:

Be it known that I, JULIUS ROEVER, a citizen of the United States, and a resident of the city of New York, county of Queens, and State of New York, have invented a new and useful Improvement in Divided-Horn Phonographs, of which the following is a full, clear, and exact description.

My invention relates to improvements in phonograph instruments of the disk type, that is instruments which are adapted to use flat disk records, and the object of my invention is to produce an exceedingly simple, compact, and inexpensive machine which can be easily operated, and which has superior qualities of tone production. My invention is intended particularly to provide an exceedingly compact arrangement of the motor, disk table, tone arm and horn with relation to each other, and to provide a connection between the tone arm and duplex outlets to a horn, said outlets being of different sizes and adapted to pick up different tones from the reproducer. In my invention the inner portions of the horn are divided as stated, have different sized inlets corresponding to the outlets of the tone arm, and the divided portions merge into one mouth portion which occupies practically the space of one side of the frame or casing. My invention is also intended to provide a very flexible connection between the tone arm and the horn which permits the tone arm to be turned and readily moved either vertically or laterally, and further to arrange the horn in respect to the motor so that the two parts will not interfere with each other structurally and the case or cabinet can therefore be made very simple and comparatively small.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar reference characters indicate corresponding parts in all the views.

Figure 1 is a plan view of the machine embodying my invention.

Fig. 2 is a broken side view of one of the tone arm joints.

Fig. 3 is a side elevation of the machine the novel parts being shown by dotted lines, and

Fig. 4 is a detail of one of the joints.

My invention lies largely in the novel arrangements of the parts comprising the ma-

chine as a whole to produce the results hereinabove stated. A short case or cabinet 10 is provided with legs 11 at the corners, and near the top is the customary disk table 12 having the usual center pin 13, and a motor 14 below it. The motor is indicated by dotted lines, and any usual motor can be employed. I have shown the machine provided with the ordinary indicator 15 and with the starting and stopping mechanism 16. The machine has a reproducer 17 connecting with an enlarged tone arm 18 which extends in a generally horizontal direction, and can be freely moved laterally or swung vertically. This tone arm is provided with a downward bend 19, which enters the extension 21, and this extends generally vertically but has a lateral bend where it merges into a short horizontal connection 22, the two parts being integral, and the member 22 being smaller at one end as shown at 23 than at the opposite end as illustrated at 25 (see Fig. 2).

The bend or neck 19 is slotted where it enters the extension 21 as shown at 20, and a pin 20^a extends through the wall of the part 21 and into said slot, thus holding the parts together, but permitting the necessary lateral movement of the tone arm.

A horizontal extension 24 of the tone arm enters the end 23 of the member 22, while a short member 26 connects with the larger end 25 of the member 22 so that the tone arm as a whole may be swung vertically as the member 22 will turn on the parts 24 or 26, and as stated the member 18 of the tone arm can be turned readily sidewise because of the jointed connection at the point 20.

When the tone arm 18 is not in use it can be lifted up so as to remove the reproducer 17 from the disk, and the neck portion, that is the generally vertical part of the tone arm, is engaged by the spring clasp 29 which is secured to the frame adjacent to the neck of the tone arm.

It will be noted that the inner end of the horn is divided into members 27 which merge into the common mouth portion 28. One part 27 of the horn connects with the member 24, and the other part with the member 26. This arrangement leaves ample room for the motor 14 between the legs of the horn, and in practice I prefer to make one member 27 smaller than the other as the drawing clearly shows. For some reason I

find that a better tone effect is obtained where the tone arm delivers through a plurality of outlets of different sizes into the horn. In any event it is clear that a better
5 result is obtained by this structure than where a single opening from the tone arm to the horn is had.

It will be noted that the arrangement is extremely simple, that the tone arm has all
10 the necessary freedom of movement, and that the machine as a whole is very compact.

I claim:—

A phonograph comprising a relatively short case or cabinet having a rotating disk
15 table at the top and driving means therefor below the disk table, a vertically and hori-

zontally swinging tone arm above the disk table, a reproducer on the tone arm, a depending neck for the tone arm having a horizontally turning joint thereon, a generally horizontal member at the lower end of the neck having openings of different sizes therein, and a horn lying beneath the disk table and its driving means, said horn having divided members provided with jointed
25 connections with the aforesaid horizontal member of the tone arm.

JULIUS ROEVER.

Witnesses:

WARREN B. HUTCHINSON,
ARTHUR G. DANNELL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

TONE ARM SUPPORT FOR TALKING MACHINES,
#1,216,614-----L.K.Scotford,
Patented-February 20th, 1917.
Filed-July 15th, 1916.

UNITED STATES PATENT OFFICE.

LOUIS K. SCOTFORD, OF CHICAGO, ILLINOIS.

1,216,614. TONE-ARM SUPPORT FOR TALKING-MACHINES.

Specification of Letters Patent. Patented Feb. 20, 1917.

Application filed July 15, 1916. Serial No. 109,489.

To all whom it may concern:

Be it known that I, LOUIS K. SCOTFORD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Tone-Arm Supports for Talking-Machines, of which the following is a specification.

My invention relates in general to talking machines and more particularly to means for pivotally supporting the tone arm of such machine.

The sound box of a disk record talking machine must be so supported as to be movable vertically and horizontally in order that it may be moved into and out of engagement with the record, and when in engagement with the record moved radially relatively thereto. These movements of the sound box are obtained by so supporting the tone arm, on which the sound box is carried, as to swing laterally and vertically either in whole or in part according to whether the tone arm comprises one rigid section or two sections pivotally connected so as to permit the end section which supports the sound box to swing vertically. My invention relates to tone arms of the former type, namely, that in which the tone arm comprises a single rigid section, the supported end of which is mounted to swing both horizontally and vertically.

The primary object of my invention is to provide an improved pivotal support for the supported end of the tone arm of a talking machine.

A further object of my invention is to provide a support for the tone arm of a talking machine by which it may freely swing both vertically and horizontally with a minimum of resistance.

A still further object of my invention is to provide a tone arm support which will be simple in construction, convenient in use, and efficient in operation.

My invention will be more fully described hereinafter with reference to the accompanying drawing, in which the same is illustrated as embodied in two convenient and practical forms, and in which:

Figure 1 is an elevational view of a portion of the tone arm of a talking machine, a part thereof being shown in a vertical section.

Fig. 2 is an elevational and part sectional

view of the keeper ring of the tone arm support, detached.

Fig. 3 is a plan view of the supported end of the tone arm, part being broken away.

Fig. 4 is a plan view of the under side of the keeper ring of the support.

Fig. 5 is a vertical sectional view through a modified form of my invention, the support and the adjacent portion of the tone arm being shown.

Fig. 6 is an enlarged detail vertical section of the modification shown in Fig. 5, taken on line 6—6 of Fig. 7.

Fig. 7 is a partial horizontal detail section on the line 7—7 of Fig. 5; and

Fig. 8 is a complete horizontal sectional view on line 7—7 of Fig. 5, the retaining ring being shown in a different position relatively to the support from that shown in Fig. 7.

Similar reference characters are used to designate similar parts in the several figures of the drawing.

Referring to Figs. 1 to 4 inclusive, reference letter A indicates the tone arm of a talking machine of any suitable construction. While I have shown a tone arm of a certain specific form, yet it will be understood that my invention is not limited to any particular shape or form of tone arm, but is applicable generally to tone arms of the type in which the supported end is mounted to swing vertically and horizontally.

B designates a tubular support provided with a circular flange b^1 at its base, which is suitably secured upon the table of the talking machine. The upper end of the support B is cut away interiorly so as to form a shoulder b^1 . Trunnions a project from diametrically opposite points on the lower end of the tone arm, such trunnions being preferably formed by the ends of a rod C which extends transversely across the end a of the tone arm. The trunnions c rest upon the shoulder b^1 and serve as the sole means for supporting the tone arm and for permitting it to swing horizontally as well as vertically.

D designates a keeper ring of a size to fit within the reduced upper end of the tubular support B with its lower edge d^1 resting upon the shoulder b^1 and with its cylindrical inner surface registering with the inner surface of the tubular support B. The ring D is provided with an outwardly

projecting peripheral flange d^2 at its top, which over-lies the reduced upper end of the support B. Notches, or recesses, d are provided in the lower edge of the ring D at diametrically opposite points thereof, such notches being of a size to loosely surround the trunnions c on the lower end a of the tone arm, and thereby retain the portion of the tone arm which projects within the support in concentric relation thereto. In order to attach the keeper ring D to the support B and at the same time permit it to freely rotate thereon, an annular groove d^3 is provided in the outer surface of its reduced lower portion into which projects screws e , extending through the reduced upper end of the support B, preferably at diametrically opposite points thereof.

The notches d extend upwardly across the groove d^3 so that the ends of the screws e , which project into the groove d^3 , are in the path of the trunnions c and serve as stops to limit the rotation of the tone arm.

In assembling the parts of which the above described form of my invention is composed, the lower end of the tone arm is placed within the upper end of the tubular support B, with the trunnions c resting upon the shoulder b^1 . The keeper ring D is then moved downwardly into engagement with the upper end of the support so that its lower edge rests upon the shoulder b^1 , and its recesses d surround the trunnions c . The screws e are then screwed inwardly so that their inner ends project within the groove d^3 .

In Figs. 5 to 8 inclusive, I have illustrated a slightly modified form of my invention, in which A^1 designates the supported end of the tone arm which rotatably fits within the upper end of the tubular support B^1 , the latter being cut away so as to form the interior shoulder b^2 upon which rests the trunnions c^1 , which are preferably formed by projecting the ends of a rod C^1 through the large lower end a^1 of the tone arm. D^1 indicates a keeper ring cut away exteriorly around its lower end so as to fit within the reduced upper end of the tubular support B^1 with its lower end resting upon the shoulder b^2 and with its upper end overlying the upper end of the tubular support.

Projecting inwardly from diametrically opposite points on the upper edge of the reduced top portion of the tubular support B^1 are lugs e^1 which are preferably formed integrally with the tubular support, as by bending inwardly portions of the metal of which the support is formed. An annular groove f^3 is formed in the outer surface of the reduced lower portion of the keeper ring D^1 at a height above its lower edge to register with the lugs e^1 when the keeper ring is

properly seated upon the tubular support. Diametrically opposed portions f^4 of the reduced lower part of the keeper ring D^1 are cut away below the groove f^3 so that the distance between such cut away portions is slightly less than the distance between the inner ends of the opposed lugs e^1 .

The parts composing the modified form of my invention shown in Figs. 5 to 8, may be conveniently assembled by first placing the lower end of the tone arm within the tubular support B^1 with the trunnions c^1 resting upon the shoulder b^2 , and then seating the keeper ring D^1 upon the upper end of the support B^1 , which may be done by locating the cut away portions f^4 immediately above the lugs e^1 and then moving the ring downwardly until its lower edge rests upon the shoulder b^2 , and with the notches d^1 overlying the trunnions c^1 .

The lugs e^1 then register with the groove f^3 so that the ring D^1 may freely rotate relatively to the tubular support B^1 and permit the requisite horizontal rotation of the lower end of the tone arm. In this form of my invention, as in the form shown in Figs. 1 to 4 inclusive, the tone arm is supported entirely by its trunnions resting upon the shoulder on the interior of the tubular support, the keeper ring merely serving to maintain the lower end of the tone arm in concentric position with relation to the surrounding support, and to prevent the disengagement of the tone arm from its support.

From the foregoing description it will be observed that I have invented an improved support for the tone arm of a talking machine, by means of which the tone arm is supported to be freely movable horizontally and vertically with a minimum of resistance. It will be further observed that my invention comprises parts which may be readily assembled, or disassembled, to permit the convenient connection of the tone arm with its support, or its removal therefrom when occasion requires.

What I claim is:

1. In a talking machine the combination with a tone arm, of a fixed tubular support within which the supported end of the tone arm projects, trunnions projecting from diametrically opposite sides of the supported end of the tone arm, a shoulder within said support on which the trunnions rest, and a keeper ring rotatably fitting within the upper end of said support and having recesses at diametrically opposite points surrounding said trunnions.

2. In a talking machine the combination with a tone arm, of a fixed tubular support, into which the supported end of the tone arm projects, trunnions projecting from diametrically opposite sides of the supported end of the tone arm, a shoulder within said

support on which said trunnions rest, a keeper ring rotatably fitting within the upper end of said support and having notches at diametrically opposite points in its lower edge surrounding said trunnions, and projections extending inwardly from said support above the shoulder thereon engaging a groove in the outer surface of said ring.

3. In a talking machine the combination with a tone arm, of a fixed tubular support, into which the supported end of the tone arm projects, trunnions projecting from diametrically opposite sides of the supported end of the tone arm, a shoulder within said support on which said trunnions rest, a keeper ring rotatably fitting within the upper end of said support and having notches at diametrically opposite points in its lower edge surrounding said trunnions, and adjustable screws projecting through said support above the shoulder thereon engaging a circular groove in the outer surface of said ring.

4. In a talking machine the combination with a tone arm, of a fixed tubular support into which the supported end of the tone arm projects, the upper end of said support being reduced in diameter interiorly to form a shoulder, trunnions projecting from dia-

metrically opposite sides of the supported end of the tone arm resting upon said shoulder, and a keeper ring rotatably fitting within the reduced upper end of said support and engaging the shoulder therein, said ring having notches at diametrically opposite points in its lower edge loosely surrounding said trunnions.

5. In a talking machine the combination with a tone arm, of a tubular support into which the supported end of the tone arm projects, trunnions projecting from diametrically opposite sides of the end of the tone arm, a shoulder within said support upon which said trunnions rest, a keeper ring rotatably fitting within the upper end of said support and having notches at diametrically opposite points in its lower edge loosely surrounding said trunnions, said keeper ring having a circular groove in its outer periphery intersected by said notches, and projections extending from said support into said groove to limit the rotation of the tone arm by intersecting the path of said trunnions.

In testimony whereof, I have subscribed my name.

LOUIS K. SCOTFORD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents Washington, D. C."

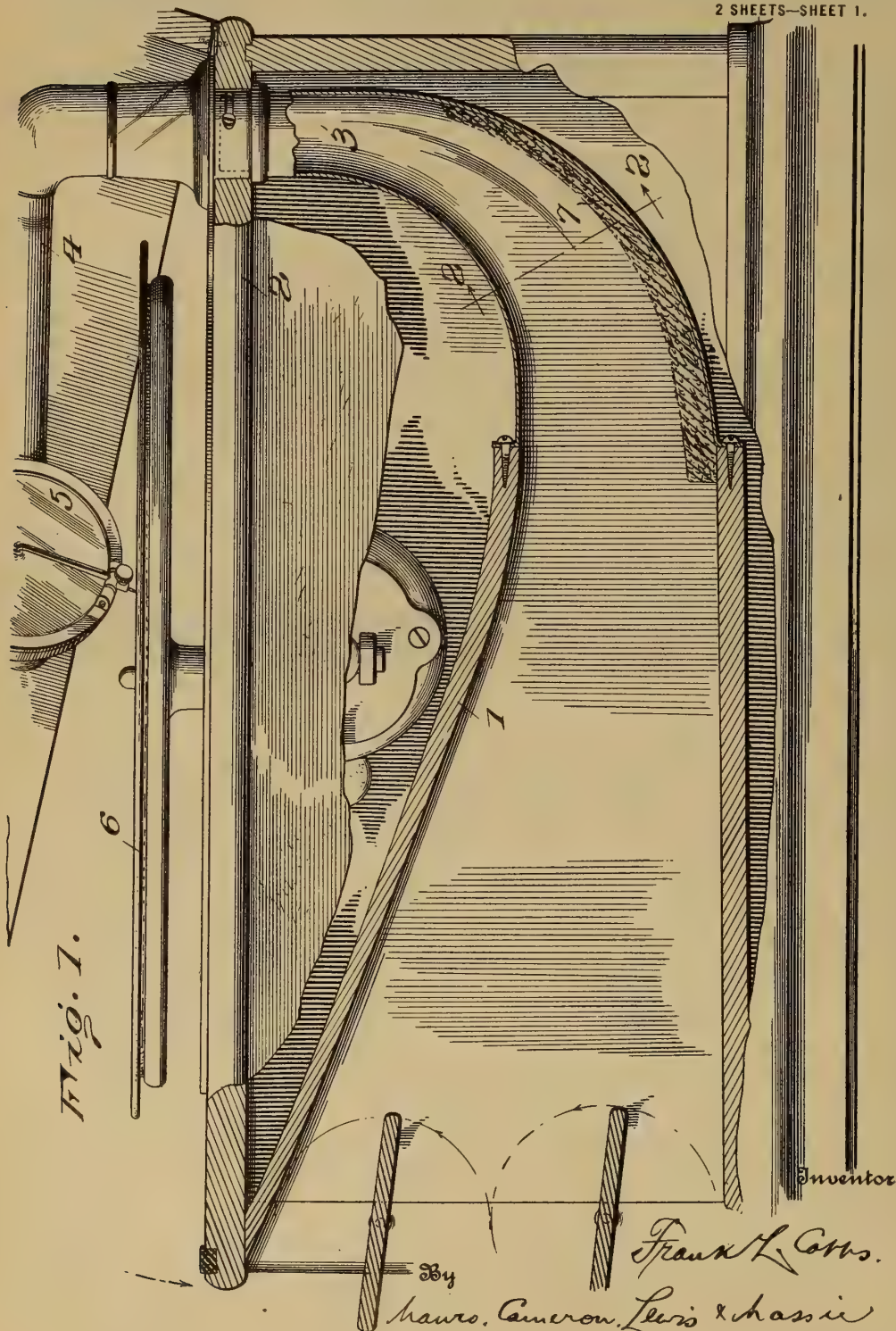
TALKING MACHINE
#1,216,656-----F.L.Capps,
Patented-February 20th, 1917.
Filed-June 17th, 1915.

1,216,656.

F. L. CAPPS.
TALKING MACHINE.
APPLICATION FILED JUNE 17, 1915.

Patented Feb. 20, 1917.

2 SHEETS—SHEET 1.



1,216,656.

F. L. CAPPS.
TALKING MACHINE.
APPLICATION FILED JUNE 17, 1915.

Patented Feb. 20, 1917.
2 SHEETS—SHEET 2.

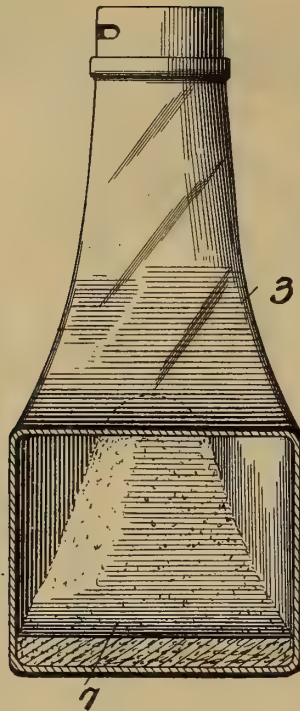


Fig. 2.

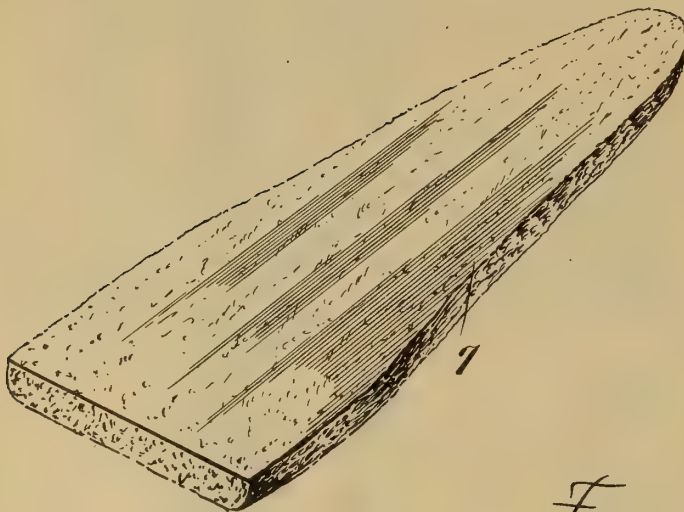


Fig. 3.

Inventor

Fraua L. Capps.

By *Lawrence Cameron Lewis & Macie*

Attorneys

UNITED STATES PATENT OFFICE.

FRANK L. CAPPS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

TALKING-MACHINE.

1,216,656.

Specification of Letters Patent. Patented Feb. 20, 1917.

Application filed June 17, 1915. Serial No. 34,721.

To all whom it may concern:

Be it known that I, FRANK L. CAPPS, a citizen of the United States, and a resident of Bridgeport, Connecticut, have invented a new and useful Improvement in Talking-Machines, which invention is fully set forth in the following specification.

This invention relates to talking machines, and has for its object to eliminate or greatly decrease the scratchy noises which occur, to a greater or less extent, in all reproductions of sound on such machines, and particularly on disk machines in which the record is composed of a hard thermoplastic material.

It is well known to those familiar with this art that, in the reproductions from the record, there occurs a scratchy foreign noise which has been attributed to various causes, but which, whatever its cause, materially interferes with the pleasant reproduction of the sound. I have discovered that, to a very large extent, these scratchy foreign noises may be suppressed by employing a pad of felt or other equivalent material in the neck or throat of the horn connected with the machine.

The inventive idea may be embodied in a variety of forms, one of which, for the purpose of illustrating the invention, is shown in the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section through a machine of the inclosed horn type, illustrating the pad in position and with parts shown in elevation;

Fig. 2 is a transverse section on the line 2—2 of Fig. 1, looking in the direction of the arrows; and

Fig. 3 is a perspective view of the pad.

Referring to the drawings, in which like reference numerals indicate like parts throughout the several views, 1 is the horn of the machine, here shown as inclosed in the ordinary or any suitable box or casing 2 and having its upper end or neck portion 3 communicating with the usual or any suitable tone-arm 4 carrying the reproducer 5 in operative relation with the record 6.

As shown, the neck or throat 3 of the horn is gradually expanded or enlarged from a point where it joins the tone-arm connection and is curved, as shown, so as to direct the sound from a vertical to a horizontal direction, as will be readily understood from an inspection of Fig. 1 and as is common in this art. Located on the interior of the neck

or throat of the horn, and on the bottom concave portion thereof, is a pad 7 of wool or other equivalent animal fiber, which pad is tapered longitudinally, as shown in Fig. 3, so as to conform to the shape of the lower concave portion of the horn, as will be better understood by an inspection of Fig. 2. I prefer to construct this pad of good quality of felt of moderate firmness, but the invention is not limited to a felted fabric, as other fabrics embodying compactly arranged woolen fibers can be used. I prefer a pad having a thickness varying from one to three sixteenths of an inch, though if desired it may be somewhat thinner or thicker than this.

The pad should be shaped so as to lie snugly within the throat of the horn and to conform to the contour thereof, and while I have shown it in connection with a horn having a neck or throat that is rectangular in cross-section, it is to be understood that it is equally applicable to horns having necks or throats of a cross-sectional form that is not rectangular.

The term "pad" has been used throughout the specification and claims to define a piece of material which is of restricted area and of such dimensions that it does not extend throughout the inner periphery of the inclosing walls of the horn at any transverse section thereof, thereby distinguishing from the linings of the prior art which engage the entire inner surface of the horn for the whole or a part of the length thereof.

What is claimed is:—

1. In a talking machine, a sound conduit adapted to be connected with the sound-box of said machine and provided with a bend whereby sound waves traveling therethrough are deflected, and a pad of sound-suppressing material applied to a wall of the conduit and opposed to the direction of travel of the sound waves prior to their deflection.

2. In a talking machine, a sound conduit adapted to be connected with the sound-box of said machine and provided with a surface adapted to deflect the major portion of the sound waves traveling through said conduit, and a pad of sound-suppressing material applied to said deflecting surface.

3. In a talking machine, a sound conduit adapted to be connected with the sound-box of said machine, a curved portion in said conduit, and a pad of sound-suppressing ma-

terial associated with said conduit at the inner concave surface of said conduit.

4. In a talking machine, a gradually enlarging sound conduit adapted to be connected with the sound-box of said machine, substantially all the inner surface or surfaces of said conduit being bare, a curved portion in said conduit, and a pad of sound-suppressing material associated with said conduit at the inner concave surface of said conduit.

5. In a talking machine, a gradually enlarging sound conduit adapted to be connected with the sound-box of said machine, a curved portion in said conduit, and a pad of felting material having a shape conforming to the curve of the conduit and located at the inner concave surface of said conduit.

6. In a talking machine, a gradually enlarging sound conduit adapted to be connected with the sound-box of said machine, said conduit being tubular part of its length and rectangular the other part, a curved portion in the rectangular part of said conduit, and a pad of felting material associated with the inner concave surface of said conduit.

7. In a talking machine having a tone-arm, the combination of a horn having a curved throat or neck connecting the body of the horn with the tone-arm, and a pad of felted fibers located within said curved throat or neck.

8. In a talking machine having a tone-arm, the combination of a horn having a curved throat or neck connecting the body of the horn with said tone-arm, and a pad of felted fibers located on the inner concave side of said throat or neck.

9. In a talking machine having a tone-arm, the combination of a horn having a curved throat or neck connecting the body of the horn with said tone-arm, and a pad of felted fibers located on the interior concave side of said throat or neck and shaped to conform to the curve of the horn.

10. In a talking machine having a tone-arm, the combination of a horn having a curved throat or neck connecting the body of the horn with the tone-arm, and a pad of wool fibers located within said curved throat or neck.

11. In a talking machine having a tone-arm, the combination of a horn having a curved throat or neck connecting the body of

the horn with said tone-arm, and a pad containing wool fibers located on the inner concave side of said throat or neck.

12. In a talking machine having a tone-arm, the combination of a horn having a curved throat or neck connecting the body of the horn with said tone-arm, and a pad of fibers located on the interior concave side of said throat or neck and shaped to conform to the curve of the horn.

13. In a talking machine, the combination of a rectangular horn for modifying and directing sound waves, said horn having a curved portion, the inner surfaces of three of the walls of said horn being entirely bare and the fourth wall partially bare, said last-named wall being adapted to direct the majority of the sound waves, and a pad of sound-suppressing material for covering the fourth wall at the curved portion of said member.

14. In a talking machine, a sound-conduit adapted to be connected with the sound-box of said machine and provided with a sound-deflecting surface, and a pad of sound-suppressing material applied only to said surface.

15. In a talking machine, a sound-conduit adapted to be connected with the sound-box of said machine and provided with a sound-deflecting surface, and a pad of sound-suppressing material applied to and substantially co-extensive with said surface.

16. In a talking machine, a sound-conduit adapted to be connected with the sound-box of said machine and provided intermediate of its length with a bend, and sound-suppressing material applied to the interior of said conduit only at said bend.

17. In a talking machine, a sound-conduit adapted to be connected with the sound-box of said machine, said conduit having a bend provided with sound-suppressing material substantially coextensive with the inner concave surface thereof.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

FRANK L. CAPPS.

Witnesses:

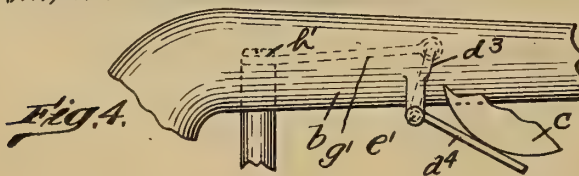
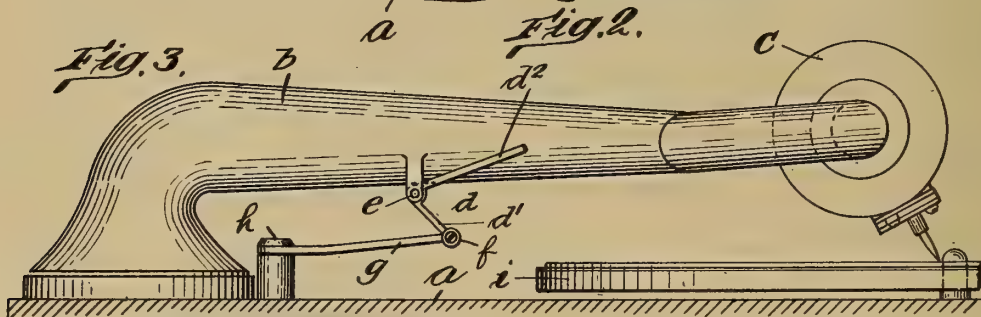
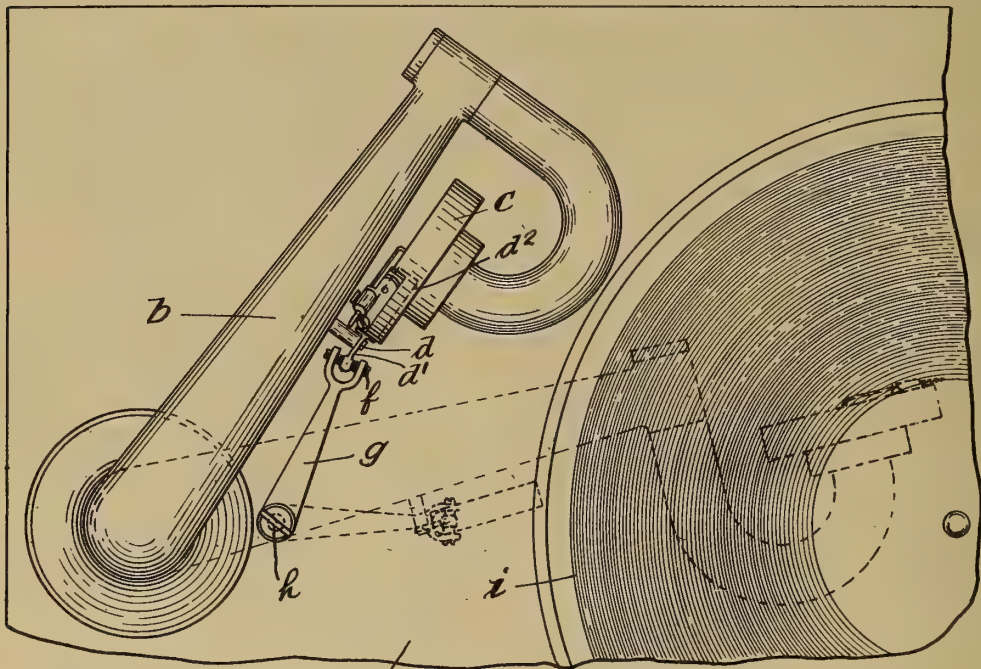
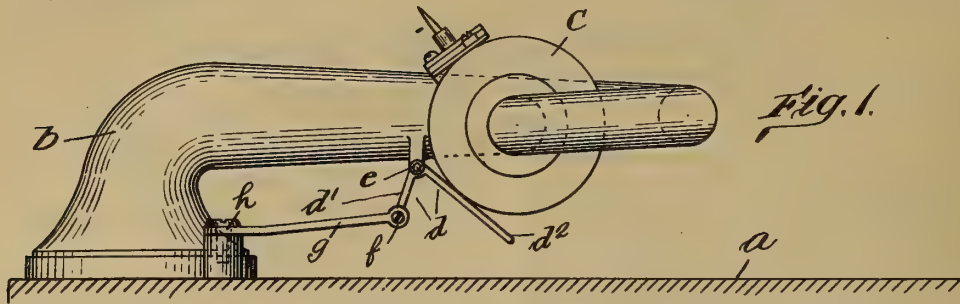
LESLIE S. EASTMAN,
J. S. GRIFFITH.

TALKING MACHINE ATTACHMENT,
#1,216,691-----W.M.Hilliard,
Patented-February 20th, 1917.
Filed-September 29th, 1916.

W. M. HILLIARD.
TALKING MACHINE ATTACHMENT.
APPLICATION FILED, SEPT. 29, 1916.

1,216,691.

Patented Feb. 20, 1917.



Inventor,
W. M. Hilliard
by *Boys & Hamilton*
attys

UNITED STATES PATENT OFFICE.

WILLIAM M. HILLIARD, OF HAVERHILL, MASSACHUSETTS.

TALKING-MACHINE ATTACHMENT.

1,216,691.

Specification of Letters Patent. Patented Feb. 20, 1917.

Application filed September 29, 1916. Serial No. 122,791.

To all whom it may concern:

Be it known that I, WILLIAM M. HILLIARD, a citizen of the United States, residing at Haverhill, in the county of Essex and State of Massachusetts, have invented an Improvement in Talking-Machine Attachments, of which the following is a specification.

This invention relates to certain improvements in talking machines of that class in which a flat, circular record is employed in connection with a horizontally swinging tone arm, on the end of which the sound box is pivoted in position to swing vertically upward from the record, past the vertical and downward, so that it rests on, or is supported by said arm.

The object of the invention is to provide an improved means for automatically swinging the tone-arm back to the starting, or initial position, after the playing of a record has been finished, and for holding it in this position until the sound box is again swung down into operative position, and, further, to provide a mechanism for the above purpose, which is of simple and durable construction, and adapted to be applied to a well-known form of talking machine now on the market.

I accomplish these objects by the means shown in the accompanying drawing, in which;—

Figures 1 and 3 are side elevations of a talking machine embodying my invention, showing the parts in different positions.

Fig. 2 is a plan view thereof.

Fig. 4 is a side elevation, indicating a modified form of the invention.

The talking machine indicated in the drawing is of well-known form comprising a cabinet *a*, on which the tone-arm or sound-box arm *b* is mounted to swing about a vertical axis, said arm having the usual sound-box *c* pivotally mounted on the end of the arm *b* to swing vertically upward from the position of use, past the vertical, and then downwardly until it is brought to rest either directly on the arm *b* or on a bracket which is carried by the arm.

According to my invention, I provide a bell-crank-lever *d*, which is mounted on a horizontal pivot *e*, secured by any suitable means to the under side of the arm *b*. The depending arm *d'* of said lever is connected at its end by a universal joint *f*, to one end of a link *g*, the other end of said link being

connected by a pivot *h* to the support on which the tone-arm is mounted, in a position to permit the link *g* to swing horizontally about an axis which is eccentric to the axis of the tone-arm *b*. The horizontally disposed arm *d*², of the bell-crank-lever *d*, is arranged in position to be engaged by the edge of the sound-box when swung rearwardly and downwardly into the position of disuse.

The parts are so arranged that, when the tone-arm and the sound-box are in position of use, as shown in Fig. 3, the arm *d*² will be raised to an upwardly inclined position, when the arm *b* is in a position adjacent the middle of the record-carrying table *i*. If, then, the sound-box is raised and swung back past the vertical, and down into engagement with said arm *d*², the weight of the sound-box will, to a large extent, be applied to the arm *d*², so that when the sound-box is lowered into engagement with the arm *d*², and its weight permitted to rest thereon, this weight will tend to press down the arm *d*², and cause the arm *d'* to be swung rearwardly, thereby causing a rearward thrust on the link *g*. As this horizontal thrust will be resisted by pivot *h*, the reactive force will cause the tone-arm to be swung away from the pivot *h*, and, therefore, away from the center of the record-supporting table, as from the position shown in dotted lines in Fig. 2, to a position at one side of the table, shown in full lines in Fig. 2. When in the latter position, the weight of the sound-box will tend to hold the arm in such position, and to prevent movement therefrom. When the sound-box is lifted and moved out of engagement with the bell-crank-lever *d*, the swinging movement of the arm will be unobstructed.

In Fig. 4, a slightly modified form of the invention is shown, in which the pivot *h'* of the link *g'* is arranged at the opposite side of the tone-arm from that shown in Figs. 1, 2, and 3, and the bell-crank-lever comprises a shaft portion *e'*, which extends beneath the arm *b*, and has arms *d*³, *d*⁴ at its opposite ends. In this instance, the arm *d*³, corresponding to arm *b'*, extends upwardly with relation to its pivot, so that when the other arm *d*⁴ is pressed downwardly by the sound-box, the latter will cause a pulling action on the link *g'*, which will, in turn, cause the arm *b* to be swung to the initial position, as already described.

I claim:—

1. In a talking machine, the combination of a sound-box arm mounted to swing horizontally to and from its initial position, a
5 sound box mounted on said arm to swing vertically and to pass the vertical when moved from its operative to its inoperative position, and means, actuated by the gravity of the sound box as it moves to its inop-
10 erative position, to swing said arm to its initial position.

2. In a talking machine, the combination of a sound-box arm mounted to swing horizontally to and from its initial position, a
15 sound box mounted on said arm to swing vertically and to pass the vertical when moved from its operative to its inoperative position, a link stationarily pivoted at one end in a position eccentric to the axis of
20 said arm, a lever pivoted on said arm and arranged to engage the opposite end of said link and to be engaged by the sound box when moved past the vertical to its inoperative position, to apply its gravity action

therethrough to the pivot of said link and
25 cause swinging movement of said arm to its initial position.

3. In a talking machine, the combination of a support, a sound-box arm mounted
30 thereon to swing horizontally to and from its initial position, a sound box mounted on said arm to swing vertically and to pass the vertical when moved from its operative to its inoperative position, an angular-shaped
35 lever pivotally mounted on said arm, and having one of its arms connected to said support in a position eccentric to the axis of said sound-box arm and the other of its
40 arms arranged to be engaged by the sound box as it moves downwardly to its inoperative position and to be swung by the weight of the sound box to actuate the sound-box arm toward its initial position.

In testimony whereof, I have signed my name to this specification.

WILLIAM M. HILLIARD.

Witness:

L. H. HARRIMAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

CONVERTIBLE SOUND BOX,
#1,216,839-----R.J.Prettie,
Patented-February 20th, 1917.
Filed-May 4th, 1915.

R. J. PRETTIE.
 CONVERTIBLE SOUND BOX.
 APPLICATION FILED MAY 4, 1915.

1,216,839.

Patented Feb. 20, 1917.

Fig. 1

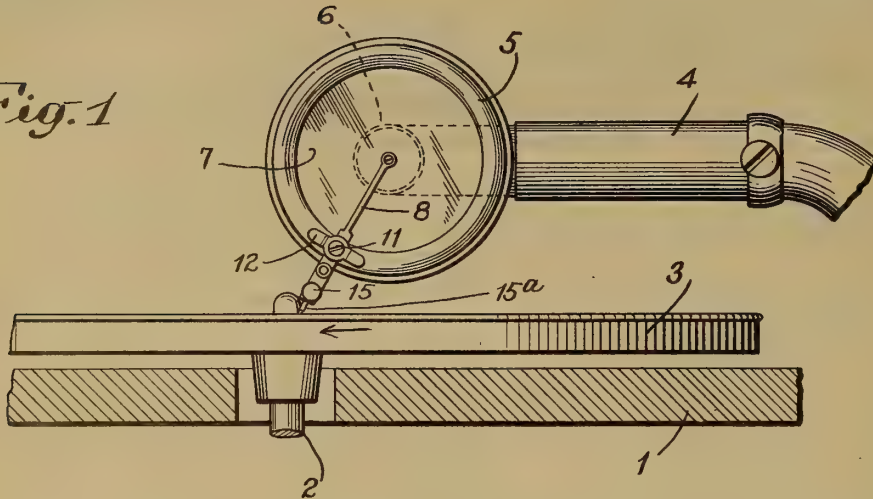


Fig. 2,

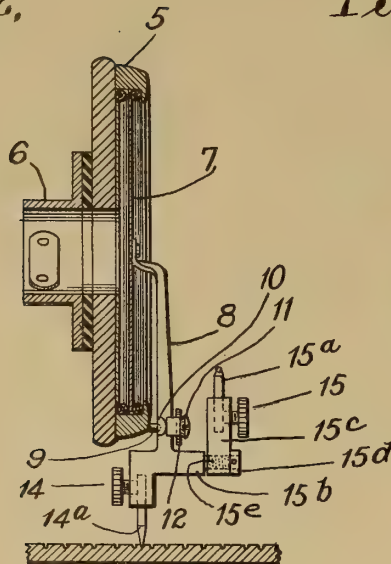
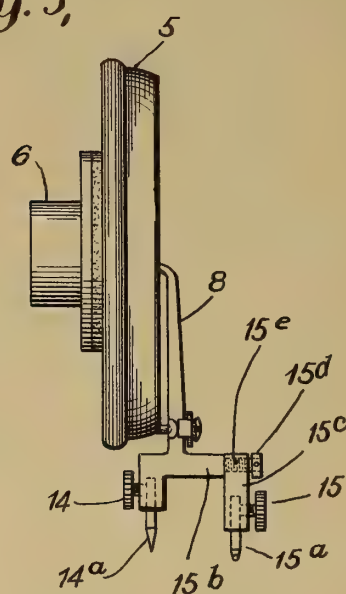


Fig. 3,



INVENTOR
Richard James Prettie
 BY
Elw Scherr ATTORNEY

UNITED STATES PATENT OFFICE.

RICHARD JAMES PRETTIE, OF JAMAICA, NEW YORK. ASSIGNOR TO THE AEOLIAN COMPANY, A CORPORATION OF CONNECTICUT.

CONVERTIBLE SOUND-BOX.

1,216,839.

Specification of Letters Patent.

Patented Feb. 20, 1917.

Application filed May 4, 1915. Serial No. 25,741.

To all whom it may concern:

Be it known that I, RICHARD JAMES PRETTIE, a citizen of the United States, residing at Jamaica, in the county of Queens and State of New York, have invented certain new and useful Improvements in a Convertible Sound-Box, of which the following is a specification.

My present invention relates to a sound-box, especially one adapted to play interchangeably both vertical and lateral wave sound-records. The advantages of my invention will be apparent to those skilled in the art from an understanding of the following description in connection with the drawings.

In these Figure 1 is a side elevation or face view of a sound-box within my invention; Fig. 2 is an enlarged cross-sectional view partly in elevation through it showing the box playing a lateral wave record; and Fig. 3 is an edge elevational view showing the box adjusted to play a vertical wave record with the ball pointed stylus.

I will now describe the specific devices of the drawings. 1 is a portion of the shelf of a phonograph, 2 the motor spindle, 3 the turn-table, 4 the tone arm. 5 is the sound-box casing having neck 6 for connection with the tone arm. 7 is the diaphragm and 8 the stylus bar. Any usual or preferred suspension may be employed for the stylus bar, that shown comprising pivot pins 9 projecting from the casing into sockets formed in the underside of a cross-piece 10 forming part of the stylus bar. 11 is a screw tapped into the sound-box casing and immediately extending without contact through a considerably larger hole in said cross-piece portion 10 of the stylus bar. 12 is a flat or leaf spring bent in the form of a bow having a central hole through which the shank of the screw 11 passes. The bent ends of this spring bear on said cross-piece 10 and force its sockets into contact with the points of the pivot pins 9 with a spring pressure depending on the adjustment of the screw 11, whose head, it will be noted, bears against the middle portion of the spring. The above details as to this suspension are claimed elsewhere and form no important part of my present invention which resides primarily in the following.

14 and 15 are stylus means forming the free end of the stylus bar and arranged respectively to play lateral and vertical wave sound

records. Each comprises a socket or equivalent stylus support and a stylus. The stylus 14^a is any ordinary or preferred needle for playing lateral records. The other stylus 15^a has a ball point or may be any other ordinary or preferred stylus for playing vertical records. In the particular embodiment shown, the stylus means 14 is an integral continuation of the stylus bar; whereas the other stylus means 15 comprises in part an integral transverse projection 15^b from the stylus bar in a direction away from the plane of the diaphragm and further comprises a pivotal part 15^c. This pivotal part has a screw-threaded hole in one end engaged by the screw-threaded reduced end of the part 15^b. 15^b is a collar or nut pinned non-rotatably on said threaded end. The arrangement is such that when the part 15^c is turned down from its position in Fig. 2 to that in Fig. 3, it screws into tight locking contact with the part 15^b. This makes the part 15^c rigid with the stylus bar so that there is no lost motion during the playing of this stylus. In this Fig. 3 position of the part 15^c, it will be noted that its stylus extends below the point of the other stylus. The result is that the former stylus 15^a can play its record without any interference from said other stylus. On the other hand to play a record with said other stylus 14^a, it is only necessary to pivot the part 15^c into its up position shown in Fig. 2, whereupon it will screw into locking contact with the stop 15^a to prevent any rattle or interference with the playing of the stylus 14^a.

The operation will now be apparent but may be summarized as follows:—To play a lateral wave sound record, the stylus means 14 will be employed with the other stylus means 15 turned up. This permits the needle 14^a of the former to engage the record without interference from the stylus 15^a. To play a vertical wave record, it is only necessary to swing the part 15^c into its down position and engage its stylus 15^a with the record, which then holds the other needle 14^a out of contact with the record. Thus it will be seen that the sound-box is convertible or changeable to play either class of record by an extremely simple adjustment without changing the angular position of the sound-box or its diaphragm to the record.

Finally it will be noted that the direction of the screw-thread 15^c is such, that a clock-

wise rotation or pivoting of the part 15° brings it into its locked position shown in Fig. 3, which means that the record by its rotation in the direction of the arrow in Fig. 1 tends to maintain said part 15° in its locked position instead of tending to unlock it.

What I claim is:—

1. A sound box comprising a diaphragm, a stylus bar and two stylus holding means on said bar arranged respectively to play vertical and lateral wave sound records without substantially changing the angular relation of the diaphragm to the record, the stylus holding means being adjustable so that either may play without interference from the other.

2. A sound box comprising a diaphragm, a stylus bar and two stylus holding means on said bar arranged respectively to play vertical and lateral wave sound records without substantially changing the angular relation of the diaphragm to the record, one stylus holding means being longer than the other and being adjustable into and out of playing position.

3. A sound box comprising a diaphragm, a stylus bar and two stylus holding means on said bar arranged respectively to play vertical and lateral wave sound records without substantially changing the angular relation of the diaphragm to the record, one stylus holding means being pivotable into and out of a playing position wherein the record engaging extremity of its stylus is below that of the other stylus holding means.

4. A sound box comprising a diaphragm, a stylus bar and two stylus holding means on said bar arranged respectively to play vertical and lateral wave sound records without substantially changing the angular relation of the diaphragm to the record, one stylus holding means being adjustable into and out of a playing position wherein the record engaging extremity of its stylus is below that of the other stylus holding means.

5. A sound box comprising a diaphragm, a stylus bar and two stylus holding means on said bar arranged respectively to play vertical and lateral wave sound records without substantially changing the angular relation of the diaphragm to the record, one stylus holding means being adjustable into and out of playing position wherein the record engaging extremity of its stylus is below that of the other stylus holding means, and means for locking said adjustable stylus holding means in its playing position.

6. A sound box comprising a diaphragm, a stylus bar and two stylus means on said bar arranged respectively to play vertical and lateral wave sound records without substantially changing the angular relation of

the diaphragm to the record, one stylus means being adjustable into and out of a playing position wherein its recording engaging extremity is below that of the other stylus means, and means for locking said adjustable stylus means in its out of playing position.

7. A sound box comprising a diaphragm, a stylus bar and two stylus means on said bar arranged respectively to play vertical and lateral wave sound records without substantially changing the angular relation of the diaphragm to the record, one stylus means being pivotable into and out of a playing position wherein its recording engaging extremity is below that of the other stylus means, and means for automatically locking said pivotal stylus means in its playing position.

8. A sound box comprising a diaphragm, a stylus bar and two stylus means on said bar arranged respectively to play vertical and lateral wave sound records without substantially changing the angular relation of the diaphragm to the record, one stylus means being pivotable into and out of a playing position wherein its recording engaging extremity is below that of the other stylus means, and means for automatically locking said pivotal stylus means in its out of playing position.

9. A sound box comprising two stylus means arranged respectively to play vertical and lateral wave sound records without substantially changing the angular relation of the box to the record, said two stylus means being located side by side and one of them being pivotable into and out of a playing position wherein it projects below the other stylus means.

10. A sound box comprising two stylus means arranged respectively to play vertical and lateral wave sound records without substantially changing the angular relation of the box to the record, said two stylus means being located side by side and one of them being pivotable into and out of a playing position wherein it projects below the other stylus means, and means for locking said pivotal stylus means in its playing and out of playing position.

11. In combination with a traveling sound record, a sound box comprising a stylus bar with a pivotal stylus part, and a screw connection and stop between said bar and said part, permitting the latter to be pivoted into playing position in the direction of travel of the record and then to come up against the stop.

In testimony whereof, I have signed my name to this specification, this 3rd day of May, 1915.

RICHARD JAMES PRETTIE.

DIAPHRAGM FOR SOUND

REPRODUCERS,

#1,217,294-----P. Fritzsche,

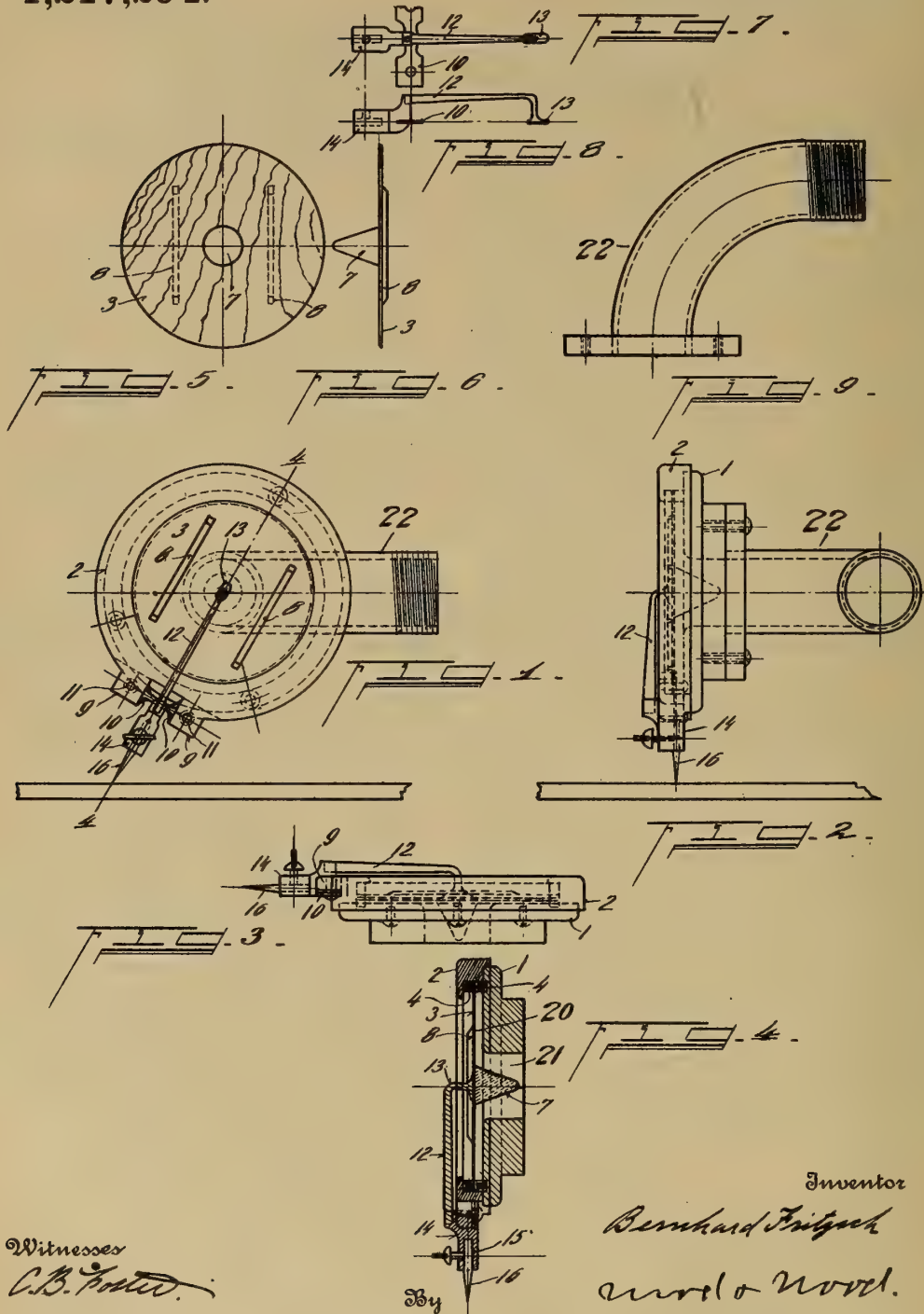
Patented-February 27th, 1917.

Filed-May 15th, 1916.

P. FRITZSCH.
DIAPHRAGM FOR SOUND REPRODUCERS.
APPLICATION FILED MAY 15, 1916.

1,217,294.

Patented Feb. 27, 1917.



Witnesses

C.B. Foster.

L. a. Beck

Inventor

Bernhard Fritzsch

and Novel.

By

Attorneys

UNITED STATES PATENT OFFICE.

BERNHARD FRITZSCH, OF CINCINNATI, OHIO.

DIAPHRAGM FOR SOUND-REPRODUCERS.

1,217,294.

Specification of Letters Patent.

Patented Feb. 27, 1917.

Application filed May 15, 1916. Serial No. 97,492.

To all whom it may concern:

Be it known that I, BERNHARD FRITZSCH, a citizen of the United States, and residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and useful Improvement in Diaphragms for Sound-Reproducers, of which the following specification is a full disclosure.

My invention relates to improvements in a phonograph sound box.

The object of the invention is to improve the tone quality and to simplify the mechanism, the particular improvement being in—regard to the structure and characteristic of the diaphragm and the needle arm.

The features of the invention will be more fully set forth in the description of the accompanying drawings, forming a part of this specification, in which:—

Figure 1 is a side elevation of the sound box. Fig. 2 is a rear elevation. Fig. 3 is a top plan view. Fig. 4 is a section on line 4—4, Fig. 1. Fig. 5 is a plan view of the diaphragm. Fig. 6 is a side elevation thereof. Fig. 7 is a plan view of the needle arm. Fig. 8 is a side elevation thereof. Fig. 9 is a top plan view of the sound converging arm.

The sound box comprises the annular members 1 and 2, screw-threaded together, being interiorly recessed for engaging the periphery of diaphragm 3, the diaphragm preferably being held between the rings 4, which rings are clamped in position between the inner recessed peripheral surfaces of the annular members 1 and 2.

The diaphragm is a thin wooden disk preferably of maple, the central portion of the inner surface being formed preferably integrally with the conical boss 7 having its base adjacent or joining with the disk. The disk is mounted in its holder with its boss projecting side inward so that the boss will extend toward or centrally into the conduit of the sound arm or amplifier. The opposite or outer side of the disk has two ribs 8 fixed thereto and located to run or extend counter to the grain and approximately at opposite sides of the axis or center of the disk. These ribs sustain the shape of the disk and also modify the disk vibrations.

The diaphragm and the portion of holding member 1 are spaced apart to constitute the sound generating chamber 20, there being a central orifice 21 through the medial

portion of member 1 leading from the sound chamber to the sound arm 22. The conical boss 7 is secured centrally to the inner face of the wooden diaphragm with the cone concentrically projecting into the opening 21 so as to constrict but not close the passageway between the sound generating chamber and sound arm. Apparently this cone acts as a governor in this sound generating chamber to prevent overvibration, the effect being to prevent blasting or sounds produced by improper diaphragm operations. A thin wooden diaphragm made say or violin material is more resilient and resonant than mica or materials heretofore used on commercial machines and I have obtained better results with such a wood diaphragm by rigidly securing the needle arm to a resilient fulcrum, such as a leaf spring, in the plane of the disk, instead of employing the pivot type of fulcrum. There seems to be coaction or the relationship of action and reaction between the wooden disk with the weighted center and this resilient fulcrum. As one end of the needle arm is rigidly secured to this leaf spring and the other end of the needle arm is rigidly secured to the center of the wooden disk opposite the cone weight, a remarkably increased sound volume is produced when the wooden disk with its central, conical boss is used with the resilient needle arm fulcrum.

On the outer periphery of the member 2 are projected two clamping posts 9, between which is secured a flat or leaf spring needle arm support 10 being held in place by screws 11. The needle arm support 12 has an inner end 13 connected to the exact center of the outer surface of the diaphragm opposite the central portion of the conical boss. The outer end of the arm is formed with the offset portion 14 extending over the peripheral edge of the annular member 2, and formed with a needle socket 15 for the needle 16, said offset portion having a slot adjacent the periphery of the annular member 2 into which fits the middle portion of the spring 10, the spring and arm being rigidly secured together, as by soldering.

I have found from experience that the diaphragm should be of a material having no tone quality, such as wood of the character of material used for violins, for instance. But when a diaphragm of this composition is employed, provision must be made

to prevent over vibration. This I accomplish by the conical boss 7, which not only reinforces the diaphragm, but weights the central portion to which the needle arm is
5 connected, thereby governing the vibratory momentum of the diaphragm.

A feature of great value also is that the needle arm is not pivotally connected to the sound-box, but is resiliently supported
10 thereon so that the reflex of the spring has functional influence on the diaphragm. I have found that the tone quality of this sound-box is robbed of all the shrillness, and has particular adaptation to recording and
15 reproducing overtones. This is particularly noticeable in piano records, generally the most difficult for reproductions, and with my sound-box, the singing tone of the piano is faithfully reproduced, and at the same
20 time the volume of the sound is materially increased.

Having described my invention, I claim:—

1. A diaphragm for a sound reproducing and recording device comprising a thin
25 wooden disk having a centrally projecting

conical boss upon one side with the base of the cone joining with the disk.

2. A diaphragm for a sound reproducing and recording device comprising a disk having a conical boss axially projecting from
30 one side with the base of the boss joining with said disk.

3. A sound reproducing and recording device comprising a diaphragm holder, having a central sound passage, a diaphragm
35 marginally secured within said holder, the inner side of the disk and holder forming a sound chamber communicating with said holder sound passage, said diaphragm having a conical boss projecting centrally from
40 its inner face to extend axially toward or into said sound passage and with the base of the cone joining with the disk.

In witness whereof, I hereunto subscribe my name, as attested by the two subscribing
45 witnesses.

BERNHARD FRITZSCH.

Witnesses:

CLARENCE B. FOSTER,
L. A. BUCK.

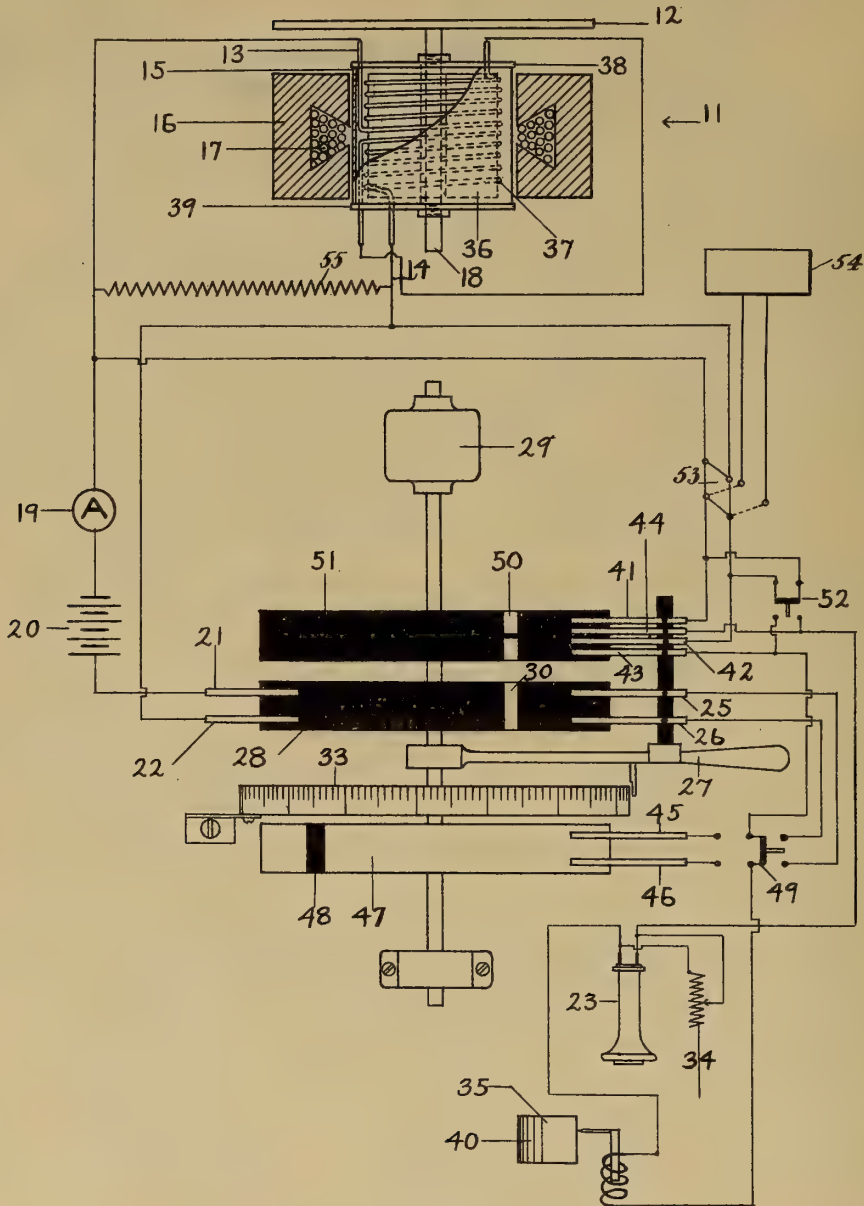
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

METHOD OF MEASURING DISTANCE,
#1,217,585-----R. A. Fessenden,
Patented-February 27th, 1917.
Filed-April 2nd, 1914.

R. A. FESSENDEN.
METHOD FOR MEASURING DISTANCE.
APPLICATION FILED APR. 2, 1914.

1,217,585.

Patented Feb. 27, 1917.



WITNESSES:

W. E. Flaherty.
A. C. O'Brien

INVENTOR

Reginald A. Fessenden

BY

Orin H. Hayes

ATTORNEYS.

UNITED STATES PATENT OFFICE.

REGINALD A. FESSENDEN, OF BROOKLINE, MASSACHUSETTS, ASSIGNOR TO SUBMARINE SIGNAL COMPANY, OF WATERTOWN, MAINE, A CORPORATION OF MAINE.

METHOD FOR MEASURING DISTANCE.

1,217,585.

Specification of Letters Patent.

Patented Feb. 27, 1917.

Application filed April 2, 1914. Serial No. 828,972.

To all whom it may concern:

Be it known that I, REGINALD A. FESSENDEN, of Brookline, in the county of Norfolk and State of Massachusetts, a citizen of the United States, have invented a new and useful Improvement in Methods for Measuring Distance, of which the following is a specification.

The invention described herein relates to methods and apparatus whereby having given, or having ascertained two or more of the following quantities, *i. e.* time, distance, intensity and medium, one or more of the remaining quantities may be determined.

For example, being given the distance between two points in a mine and having determined the time taken by a sound wave to travel between the two points, it is possible to draw conclusions with regard to the probable nature of the rock between the two points; or if an echo be observed or a refraction of the sound, it is possible to estimate the distance of the reflecting or refracting vein.

Again, if a sound be produced on a ship and the time elapsing between the production of the sound and its echo from the bottom be determined, it is possible to determine the distance between the bottom of the ship and the bottom of the water. If the intensity of the echo be determined, it is possible to determine approximately the character of the bottom, that is, whether it be mud, or sand, or gravel, or rock.

If the echo be from an iceberg or layer of melted ice surrounding the iceberg or from another ship, it is possible to determine how far the iceberg is from the ship.

The invention relates especially to sound-
ing, but is not limited to measuring distance in a vertical direction, or in a single medium, being applicable to all directions and mediums, and to determine other quantities besides distance as stated above, for example, the nature of the medium.

The accompanying drawing forming a part of this specification shows diagrammatically apparatus suitable for use in connection with my invention.

That distance could theoretically be determined by sound echoes has long been known, but this knowledge has never been put into commercial use on account of the lack of any method which was practical and of the lack of any practical appara-

tus. For example, if a ship drawing twenty-five feet was running up a channel having a depth of fifty feet, the time taken by the sound of a bell in traveling from the bottom of the ship to the bottom of the channel and back to the ship would be only about one one-hundredth of a second, and to determine the depth to within one foot would necessitate knowing the time elapsing between the time at which the bell clapper struck the bell and the time at which the echo returned to the nearest four ten-thousandths of a second which is impossible by any method heretofore suggested or in use.

In addition, since the sound of the blow of the bell would be heard in the receiving apparatus, the ear would be rendered insensitive and the echo would not be heard, being much fainter and being drowned out by the vibration of the bell persisting after the clapper had struck.

My method comprises a number of new features, and while all of them are not necessarily used in combination in all cases, they are peculiarly adapted to cooperate to give good results in the cases most commonly met with.

One of these features is that the sound production and echo reception are electrically interlocked, so that the time elapsing between them is determined by the time elapsing between two electrical phenomena, and can be determined with great accuracy.

A second is that the receiver is cut out while the sound is being produced and the sound producer is cut out while the sound is being received.

A third is that the sound impulse is produced over a definite time and at a definite intensity and then ceases abruptly, instead of dying away gradually.

A fourth feature is that the depth may be recorded graphically on a moving tape.

A fifth feature is that the same apparatus (a magnetophone, for example,) may be used to produce the sound and to receive it.

A sixth feature is that the electric impulse used for producing the sound by the motion of the current carrying conductor may be derived from a direct current source.

There are other features which will be apparent from the description, and are novel in method and apparatus.

In the figure 11 is a source of sound, preferably the oscillator described in my United

States Patent No. 1,167,366, dated January 4, 1916. Here 12 is the diaphragm which being immersed in water in the fore peak of a vessel, or inserted in the skin of the ship, by its motion produces the sound. 13 and 14 are the terminals of a fixed winding 37 on the core 36, and 15 is a movable copper tube attached to the rod 18 by the disks 38, 39, which rod is fastened to the diaphragm 12. 16 is an electromagnet excited by the coil 17. When an alternating or fluctuating current passes through the core winding 37 currents are induced in the copper tube 15 by transformer action, and the tube being in the strong magnetic field generated by a direct current in the coil 17, oscillates with great force, and actuates the diaphragm 12, producing a sound which ceases immediately the electric current ceases to pass through the winding 37.

A wheel or commutator 28 of insulating material and having a metallic segment 30, is rotated at a definite speed by the motor 29. The battery or other source of voltage indicated at 20 and the ammeter 19 are connected to the brush 21 and one terminal 13 of the winding 37, and the brush 22 is connected to the other terminal 14.

When the brushes, 21, 22 both rest on the conducting segment 30, the battery 20 sends an electric impulse through the winding 37 and the diaphragm 12 is pushed out or in producing a sound in the water, and this occurs at each revolution of the commutator 28.

In this way a musical note is produced whose pitch will depend upon the number of revolutions per second of the commutator 28.

The oscillator above described also acts as a sound receiving transmitter for on a sound wave striking the diaphragm 12, it is moved in and moves the tube 15 which, being a conductor moving in a magnetic field, has a current generated in it by the movement, and this current in turn generates a current in the fixed winding 37 by transformer action, which flows out by the terminals 13, 14 to the brushes 41, 42 on the hard rubber wheel 51, thence, when the conducting segments 50 pass beneath them, to the brushes 43, 44, and thence through the telephone receiver 23 and recording apparatus 35, either or both of which may be termed an indicating mechanism, to the two-way switch 49, and thence to the brushes 25, 26, whenever the two-way switch is closed to the right and the segment 30 of the wheel 28 passes beneath the brushes, thus completing the circuit.

It will be seen that the telephone receiver circuit is only completed when the segments 30 and 50 pass beneath the brushes in the receiver circuit, and that this will occur at some time later than the segment 30 has passed beneath the brushes 21, 22 generat-

ing the sound. Consequently no sound will be heard in the telephone receiver 23 until the brushes 41, 42, 43, 44, 25, 26 are shifted by the movable arm 27, to which they are attached, to such a position that the segments 50, 30 pass under them at exactly the instant that the echo from the sound has come back from the bottom and struck the diaphragm 12.

And it will be apparent, since the wheels 28 and 51 revolve at a fixed speed, that the angle through which the brush arm 27 is moved will be a function of the distance of the reflecting bottom, and that the apparatus may be so constructed and graduated that this distance can be read off directly on the scale 33 in feet.

To ascertain in the first place whether there is any iceberg, for example, near enough to produce an echo receivable on board a ship carrying the sounder, I prefer to cut out the brushes 41, 42, 43, 44 by the switch 52 and to throw in the double pole switch 49 so as to connect the receiver circuit to the metal wheel 47 which carries the insulating segment 48. This segment 48 is so located on the periphery of the wheel 47 that as the wheel 47 rotates the segment 48 passes under the brushes 45, 46 and breaks the circuit through them at exactly the instant the battery circuit is closed and its current generates a sound, that is, at exactly the instant the brushes 21, 22 rest on the conducting segment 30 so that the receiver circuit is always closed through the oscillator except at the instant the sound is being generated. During this period the receiver is always receptive except at the moment sound is being sent out and as soon as the receipt of echoes begins they will be received at the indicating mechanism. When so received the switches 49 and 52 are thrown back so that the brushes 45, 46 are cut out and the brushes 41, 42, 43, 44 are cut in and the process of determining the distance of the reflecting surface (iceberg) is carried on as before described.

The metal wheel with its connecting mechanism serves therefore for a preliminary observation only as it will give exactly the moment when the first echo is received on a vessel approaching a reflecting surface.

Instead of this the brush arm may be shifted until the musical note or echo is picked up, but by this course it is not so certain that the first indication of echo will be received because it may come while the circuit through the brush arm connection is open.

It will of course be understood that as shown in the drawing the segments 48 and 30 are not in proper relation to secure the above result. A proper adjustment of the wheel 47 on its axis would remedy this

fault, but such adjustment would carry the segment 48 to the under side of the wheel so that it would not be shown in the view.

The recorder 35 may be of any of the usual types, preferably one by which the record is made in a moving strip of paper 40 such as for instance the well known Callender thermal recorder.

The wheel 51 is for cutting out electrostatic disturbance which might be produced on the receiver 23 unless the circuit were opened at the ends of both leads to the receiver. The wheel 51 accomplishes this by having two conducting segments 50 side by side on its periphery, one of which engages the brushes 41, 44 and the other 42, 43. When these brushes do not rest on the segments 50 the circuit is broken on both sides of the receiver. At 34 is shown means for measuring the intensity of the sound which may be used if desired.

This device is a variable resistance and is operated by throwing in resistance until the sound is modified so as to be just audible and taking account of the amount of resistance thrown in, then by performing the same operation when another sound is received. By comparing the amount of resistance thrown into circuit in each case the intensity of the sounds are measured comparatively.

The apparatus may be used to locate icebergs or geological strata or other reflecting bodies. For measurement of long distances the speed of rotation of 28 may be slow, or an ordinary stop watch used to measure the time instead of shifting the arm 27. For icebergs a long wave length is preferably used to insure reflection or diffraction fringes. The wave length may be as long as 100 feet or more.

In place of connecting the source of sound 11 to the echo indicating mechanism 23, 23 may be connected, by throwing the switch 53 to the position shown by dotted lines so as to connect a second receiving transmitter 54, 11 being used for producing the sound and 54 being used for receiving the echo.

This method is especially valuable when the depth of sounding is small and when the diaphragm 12 does not come to rest with sufficient abruptness.

Another method of accomplishing this, *i. e.*, bringing the diaphragm to rest substantially instantaneously is by placing a resistance 55, preferably non-inductive, across the terminals of the oscillator as shown.

The method is also distinguished from previous methods in that the electric forces act directly upon the diaphragm to set it in motion to produce sound instead of first acting upon an intermediate mechanism such as a hammer and then causing the hammer to impact upon the diaphragm and thereby

produce the sound. The omission of the intermediate mechanism greatly increases the efficiency of the apparatus.

What I claim as my invention is:

1. The method of measuring distance by sound inflection which consists in varying the current in an electric circuit at the sending end, setting up at the sending end sound vibrations identical in time with the current variations in said electric circuit, directing said sound vibrations against an objective, transforming the sound vibrations inflected by said objective when received into electric impulses identical in time with said received sound vibrations and measuring the time elapsing between the beginning of each set of electric impulses.

2. The method of measuring distance by sound inflection which consists in varying the current in an electric circuit at the sending end, setting up at the sending end sound vibrations identical in character with the current variations in said electric circuit, directing said sound vibrations against an objective, transforming the sound vibrations inflected by said objective when received into electric impulses identical in character with said received sound vibrations and measuring the time elapsing between the beginning of each set of electric impulses.

3. The method of measuring distance by sound inflection which consists in varying the current in an electric circuit at the sending end, setting up at the sending end sound vibrations identical in frequency with the current variations in said electric circuit, directing said sound vibrations against an objective, transforming the sound vibrations inflected by said objective when received into electric impulses identical in frequency with said received sound vibrations and measuring the time elapsing between the beginning of each set of electric impulses.

4. The method of measuring distance by sound inflection which consists in varying the current in an electric circuit at the sending end, setting up at the sending end sound vibrations identical in time, character and frequency with the current variations in said electric circuit, directing said sound vibrations against an objective, transforming the sound vibrations inflected by said objective when received into electric impulses identical in time, character and frequency with said received sound vibrations and measuring the time elapsing between the beginning of each set of electric impulses.

5. That method of measuring distance by sound inflection which consists in transforming electrical impulses into sound vibrations for a predetermined period, which sound vibrations are directed against the objective, transforming the sound vibrations which are inflected by said objective into electrical impulses and measuring the time between the

commencement of said predetermined period and the first receipt of said inflected impulses.

5 6. Mechanism for measuring distance comprising a sounder, a receiving mechanism comprising a receiving transmitter and an indicating mechanism, means for operating the sounder and means adapted to operate automatically when the sounder is silent
10 to connect the receiving transmitter and the indicating mechanism.

7. Mechanism for measuring distance comprising a sounder, a receiving transmitter, an indicating mechanism, means for operating the sounder intermittently, time measuring means operable when the sounder is silent for connecting the receiving transmitter with the indicating mechanism, and sound picking up means operable at all
15 times when the sounder is silent for connecting the receiving transmitter with the indicating mechanism.

8. Mechanism for measuring distance comprising a sounder, a receiving transmitter, an indicating mechanism, means for operating the sounder intermittently, time measuring means operable momentarily when the sounder is silent for connecting the receiving transmitter with the indicating
20 mechanism, and sound picking up means operable at all times when the sounder is silent for connecting the receiving transmitter with the indicating mechanism, said two connecting means being inoperable simultaneously.

9. Mechanism for measuring distance comprising a sounder, means for operating it, a receiving mechanism comprising a receiving transmitter and an indicating
25 mechanism, a broken circuit connecting said receiving transmitter and said indicating mechanism, a series of brushes and means for adjusting their position to close said broken circuit, whereby said broken
30 circuit may be closed when said sounder is silent and said receiving transmitter is energized.

10. Mechanism for measuring distance comprising a sounder, means for operating it, a receiving transmitter and an indicating mechanism, a broken circuit connecting
35 said receiving transmitter and said indicating mechanism, a series of brushes, and means for adjusting their position to close said broken circuit, whereby said circuit may be closed when said sounder is silent and said receiving transmitter is energized,
40 and means whereby the adjusted position of said brushes may be measured.

11. In a device of the kind described, an electromagnetic mechanism operable both to produce and receive impulses, means for energizing said mechanism to produce im-
45 pulses, and means operable when said impulse-producing mechanism is inoperative

to enable said mechanism to receive im- pulses.

12. In a device of the kind described, a sounder and a receiving transmitter, means for energizing said sounder comprising a
50 source of electricity, a rotary wheel of insulating material having a contact thereon, brushes engaging said wheel and periodically engaging said contact, connections between said brushes, said source of electricity
55 and said sounder, an indicator, and connections between said receiving transmitter and said indicator operable only when said sounder is silent.

13. In a device of the kind described, a sounder and a receiving transmitter, means for energizing said sounder comprising a
60 source of electricity, a rotary wheel of insulating material having a contact thereon, brushes adapted to engage said contact, connections between said brushes, said source of electricity and said sounder, an indicator,
65 a second set of brushes also adapted to engage said contact, and connections between said second set of brushes and said telephone receiver comprising an automatic circuit breaker adapted to break said circuit
70 when said sounder is energized.

14. In a device of the kind described, a sounder and a receiving transmitter, means for energizing said sounder comprising a
75 direct current source of electricity, a rotary wheel of insulating material having a contact thereon, brushes adapted to engage said contact, connections between said brushes, said source of electricity and said sounder,
80 an indicator, a commutator having a contact thereon, adjustable brushes adapted to engage said contact when said sounder is silent, and connections between said adjustable brushes, said receiving transmitter and
85 said indicator whereby upon the proper adjustment of said adjustable brushes with relation to said contact said receiving transmitter may operate said indicator.

15. In a device of the kind described, a sounder and a receiving transmitter, means for energizing said sounder comprising a
90 source of electricity, a rotary wheel of insulating material having a contact thereon, brushes adapted to engage said contact, connections between said brushes, said source of electricity and said sounder, a telephone
95 receiver, a commutator having a contact thereon, adjustable brushes adapted to engage said contact when said sounder is silent, and connections between said adjustable brushes, said receiving transmitter and said telephone receiver whereby upon
100 the proper adjustment of said adjustable brushes with relation to said contact said receiving transmitter may operate said telephone receiver, and means for measuring
105 the position of said brushes.

16. In a device of the kind described, a 130

sounder, and means for energizing it comprising a source of electricity, means for rendering said sounder silent, a receiving transmitter and means operable when said
5 sounder is silent to receive vibrations from said receiving transmitter.

17. A device for measuring distance comprising an electrically energized sounder having a diaphragm and means for bringing the diaphragm to rest coincidentally
10 with the breaking of the sounder circuit consisting of a resistance connecting the terminals of the sounder.

18. As a means for measuring distance, a receiving transmitter, and an electrically-energized sounder having a diaphragm, and means for damping the diaphragm coincidentally with the deenergizing of said
15 sounder whereby the receiving transmitter will be energized by the echo only, said means consisting of a resistance connecting the terminals of said sounder.

19. The method of measuring distance which consists in, first, rendering irresponsive the sound receiving mechanism, second,
20 varying the current in an electric circuit simultaneously with the production of the sound to be inflected, thirdly, stopping the

variation of the current flow, fourthly, damping the sending mechanism, and
30 fifthly, rendering the receiving mechanism responsive.

20. The method of measuring distance which consists in causing the production of sound by varying the current in an electric
35 circuit, then ceasing the current flow and simultaneously damping the sound producer and rendering a receiving mechanism responsive.

21. That method of measuring distance which consists in varying the current in an electromagnetic mechanism, causing the forces so produced to act directly and positively upon a diaphragm thereby setting the
40 diaphragm in motion and setting up sound vibrations, directing said sound vibrations against an objective thereby inflecting the vibrations, receiving said inflected vibrations and measuring the elapsed time between the setting up of the vibrations and
45 their reception.

REGINALD A. FESSENDEN.

Witnesses:

GEORGE O. G. COALE,
M. E. FLAHERTY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PHONOGRAPH,
#1,217,723----R.A.Dunbar,
Patented-February 27th, 1917.
Filed-March 31st, 1916.

R. A. DUNBAR.
 PHONOGRAPH.
 APPLICATION FILED MAR. 31, 1916.

1,217,723.

Patented Feb. 27, 1917.

Fig. 1

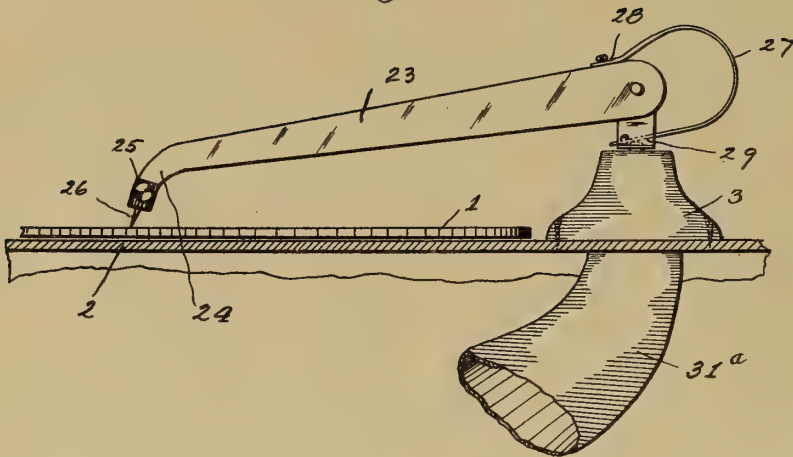


Fig. 2

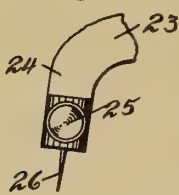


Fig. 3

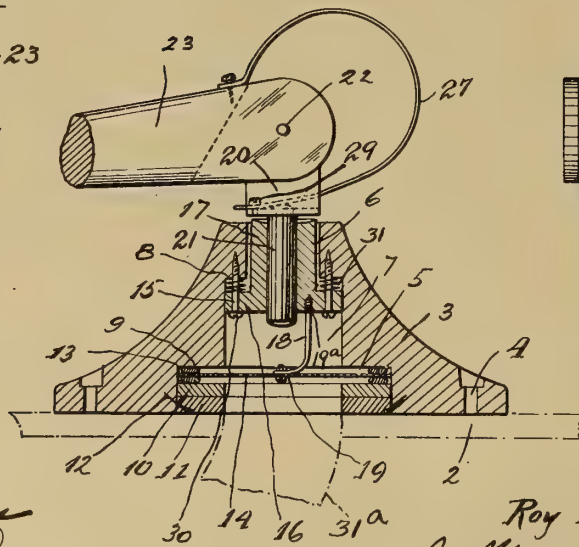
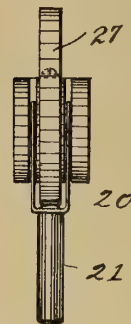


Fig. 4



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INVENTOR
Roy A. Dunbar
 By *Max H. Arlon*
 ATTORNEY

UNITED STATES PATENT OFFICE.

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PHONOGRAPH.

1,217,723.

Specification of Letters Patent.

Patented Feb. 27, 1917.

Application filed March 31, 1916. Serial No. 87,917.

To all whom it may concern:

Be it known that I, ROY A. DUNBAR, a citizen of the United States, residing at Evans City, in the county of Butler and State of Pennsylvania, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

This invention relates to phonographs and has for its object to provide a machine of such type, in a manner as hereinafter set forth, whereby its solid arm is employed for transferring vibration from the needle to an element connected with the reproducer disk for the purpose of vibrating the latter to create sound waves.

Further objects of the invention relate to the providing of a phonograph which is simple in its construction and arrangement, strong, durable, efficient in its use, and inexpensive.

With the foregoing and other objects in view the invention consists of the novel construction, combination and arrangement of parts, as hereinafter more specifically described and illustrated in the accompanying drawings, wherein is shown an embodiment of the invention, but it is to be understood that changes, variations and modifications can be resorted to which come within the scope of the claims hereunto appended.

In the drawings wherein like reference characters denote corresponding parts throughout the several views:—

Figure 1 is a side elevation, broken away, of a phonograph in accordance with this invention.

Fig. 2 is a detail illustrating the needle.

Fig. 3 is a sectional elevation illustrating an element of the machine.

Fig. 4 is a detail of a transferring arm joint.

Referring to the drawings in detail 1 denotes a revolving element for a phonograph record disk and which is mounted upon the top of the base 2 of the machine and operated in a known manner.

Mounted upon the base 2 is a tapering support 3, having openings 4 for the passage of securing devices for connecting said support with the base 2. The support 3 has a centrally disposed stepped opening and that

portion of larger diameter, which is the lower part of the opening, is indicated at 5. The upper part of the opening, which is indicated at 6, is the portion of smaller diameter and the intermediate part of said opening is indicated at 7, and which is of greater diameter than the upper portion 6, but of less diameter than the lower portion 5. By providing the opening with three different diameters, the wall of said opening is formed with shoulders 8, 9.

Arranged within the lower portion 5 of the opening in the support 3, is a pair of washers 10, 11, which are superposed with respect to each other, and the washers 11 have securing devices 12 extending there-through, and in the support 3 whereby said washer 11 is fixedly maintained in position.

Interposed between the washer 10 and shoulder 9 is a supporting member 13 for a reproducer disk 14 which is preferably constructed of mica and said disk 14 is spaced from the shoulder 9, as well as the washer 10, and extends across the openings in the support 3.

Depending from the shoulder 8 are a plurality of hangers 15 upon which is loosely mounted the flange 16 of a reciprocatory sleeve 17, the latter extending up through the upper portion 6 of the opening and of such diameter with respect to the diameter of said portion whereby said sleeve 17 will be slightly spaced from the wall thereof. The sleeve 17 is connected with the disk 14, by a curved controlling arm 18, which is fixed, as at 19, to the disk 14, and as 19^a to the sleeve 17. The reciprocatory motion of the sleeve 17 will be conducted by the arm 18 to the disk 14 causing the latter to vibrate and create sound waves.

The reference character 20 denotes a harp, having a stem 21 depending therefrom and which projects through the sleeve 17. Pivotaly mounted by the pivot pin 22, which is carried by the harp 20, is the rear end of a solid transferring arm 23, which has its forward end bent downward as at 24, and has detachably connected therewith, by the set screw 25, a needle 26, the latter being adapted to travel in the record disk 2. The arm 23 is preferably constructed of light material, such as wood, or aluminum, and when

constructed of such material a bow-shaped spring 27 is employed, which is connected at its upper end, as at 28, to the rear of the top edge of the arm 23, and at its lower end is connected as at 29, within the yoke, to the base thereof. The arm 23 may be constructed of solid steel or brass and when such material is employed the spring 27 is dispensed with.

10 The arm 23 is adapted to transfer the vibratory motion of the needle 26 to the stem 21 and the movement of the stem 21, is transferred to the sleeve 17, causing the same to reciprocate, and as the sleeve 17 is connected with the disk 14, by the arm 18 the latter will transfer the motion of the sleeve 17 to the disk 14, causing the latter to vibrate.

The manner of setting up the yoke and stem with respect to the sleeve 17, will permit of the yoke swinging with respect to the sleeve 17, and as the arm 23 is pivotally connected with the yoke, it is obvious that the connection between the sleeve 17 and the arm will permit of the arm swinging not only upon a horizontal pivot but also a vertical pivot.

The heads 30 of the hangers 15 arrest downward movement of the sleeve 17.

30 Attached to the washers 11 is a horn 31^a. Loosely mounted upon the hangers 15, between the flange 16 of the member 17 and the shoulder 8 are springs 31 which prevent the flange 16 contacting with the shoulder 8 and which furthermore tend to assist in the reciprocatory movement of the sleeve 17.

The coil springs 31 and the hangers 15 cause the supporting member 17 to vibrate while the disk 14 is held rigid in the support

40 3. The pivot pin 22 constitutes a friction joint and does not cause a loss of the vibration, but the joint is held closed until the vibrations reach the mica disk. The springs around the hangers, are what may be termed, the only open joint and permit the inner section to vibrate while the mica disk is held in position. The disk 14 is held in position by the washers 10; 11, arranged on each side thereof, and by such an arrangement the full vibration from the needle to the disk is obtained.

What I claim is:—

1. A phonograph comprising a reciprocatory sleeve, a solid arm transferring vibration from a phonograph needle to said sleeve, means to provide a horizontal and vertical pivotal connection between said arm and said sleeve, a reproducer disk, and an arm connecting the sleeve to said disk.

60 2. A phonograph comprising a reciprocatory sleeve, a solid arm transferring vibration from a phonograph needle to said sleeve, means to provide a horizontal and vertical pivotal connection between said arm and said

sleeve, a reproducer disk, an arm connecting the sleeve to said disk, and a spring having one end attached to said connection and its other end to the rear end of said transferring arm.

3. A phonograph comprising a reciprocatory flanged sleeve, a support having said sleeve arranged therein, an arm transferring vibrations from a phonograph needle to said sleeve, means to provide a horizontal and a vertically disposed pivotal connection between said arm and said sleeve, a reproducer disk mounted in said support below the sleeve, an arm connecting said sleeve to said disk, hangers fixed within said support and extending through the flange of the sleeve, and springs loosely mounted on the hangers and engaging the upper face of the flange.

4. A phonograph comprising a reproducer disk, a solid arm for transferring vibrations from the phonograph needle, a connection between said arm and said disk whereby the vibrations transferred by the arm are conducted to said disk to create sound waves, said connection including a flanged sleeve mounted on hangers and springs carried by the hangers and bearing against the upper face of the flange of the sleeve and a bow-shaped spring having one end attached to said connection and its other end secured to the rear end of said arm.

5. A phonograph comprising a reproducer disk, a solid arm for transferring vibrations from the phonograph needle, a connection between said arm and said disk whereby the vibrations transferred by the arm are conducted to said disk to create sound waves, and a support for said connection and disk, said connection including hangers secured to and depending within the support, a flanged sleeve slidably mounted on said hangers, and springs loosely mounted on the hangers and engaging the upper face of the flange of the sleeve.

6. A phonograph comprising a reproducer disk, a solid arm for transferring vibrations from the phonograph needle, a connection between said arm and said disk whereby the vibrations transferred by the arm are conducted to said disk to create sound waves, a bow-shaped spring having one end attached to said connection and its other end secured to the rear end of said arm, and a support for said connection and disk, said connection including hangers arranged within the support, a flanged sleeve slidably mounted upon said hangers and springs surrounding the hangers and engaging the upper face of the flange of the sleeve.

7. A phonograph comprising a reciprocatory flanged sleeve, a support having said sleeve arranged therein, an arm transferring vibrations from a phonograph needle to said sleeve, means to provide a horizontal and a

vertically disposed pivotal connection between said arm and said sleeve, a reproducer disk mounted in said support below the sleeve, an arm connecting said sleeve to said disk, hangers fixed within said support and extending through the flange of the sleeve, and springs loosely mounted on the hangers and engaging the upper face of the flange, and a spring having one end attached to

said connection and its other end to the rear 10 end of said transferring arm.

In testimony whereof I affix my signature in the presence of two witnesses.

ROY A. DUNBAR.

Witnesses:

E. B. EVANS,
RAY ELLIOTT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PHONOGRAPHIC ATTACHMENT,
#1,217,794-----E.F. McDonald, Jr.,
Patented-February 27th, 1917.
Filed-June 26th, 1916.

E. F. McDONALD, JR.
 PHONOGRAPHIC ATTACHMENT.
 APPLICATION FILED JUNE 26, 1916.

1,217,794.

Patented Feb. 27, 1917.

2 SHEETS—SHEET 1.

Fig. 1.

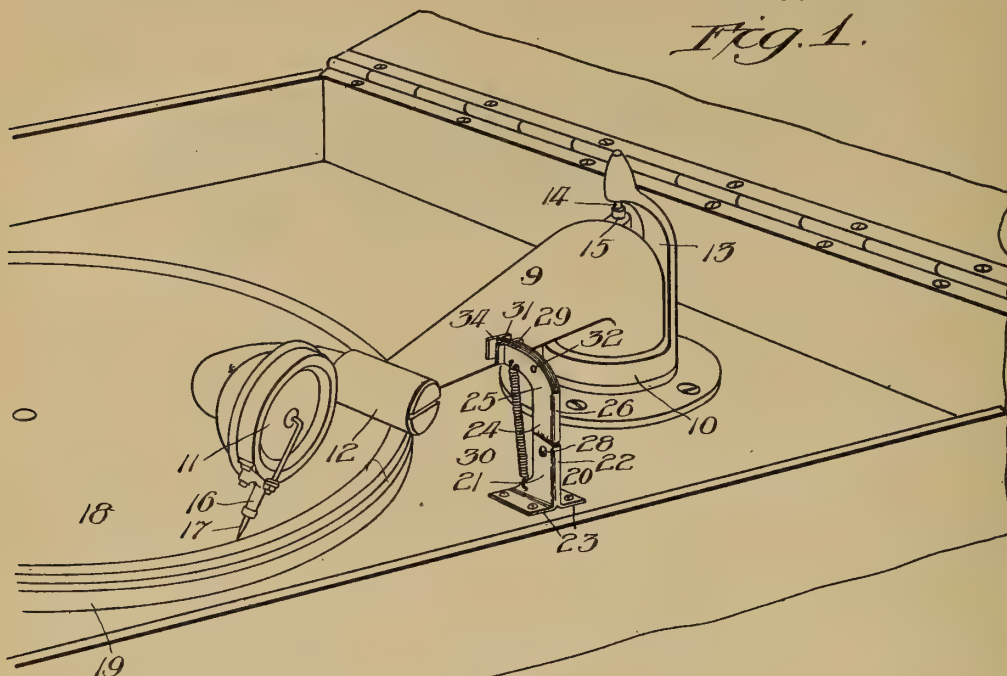


Fig. 3.

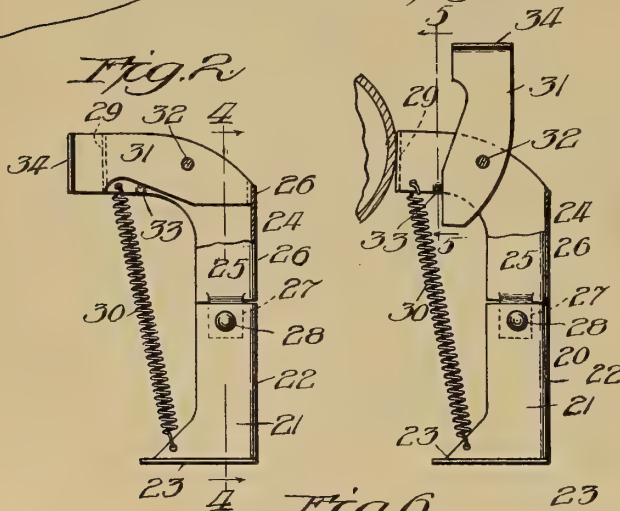


Fig. 4.

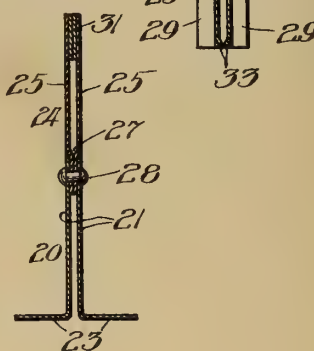
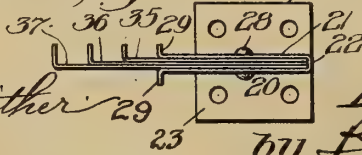


Fig. 6.



Witness:
Harry S. Gaither

Inventor:
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 by *Dunning & Lammie*,
 Attys

E. F. McDONALD, JR.
 PHONOGRAPHIC ATTACHMENT.
 APPLICATION FILED JUNE 26, 1916.

1,217,794.

Patented Feb. 27, 1917.

2 SHEETS—SHEET 2.

Fig. 7.

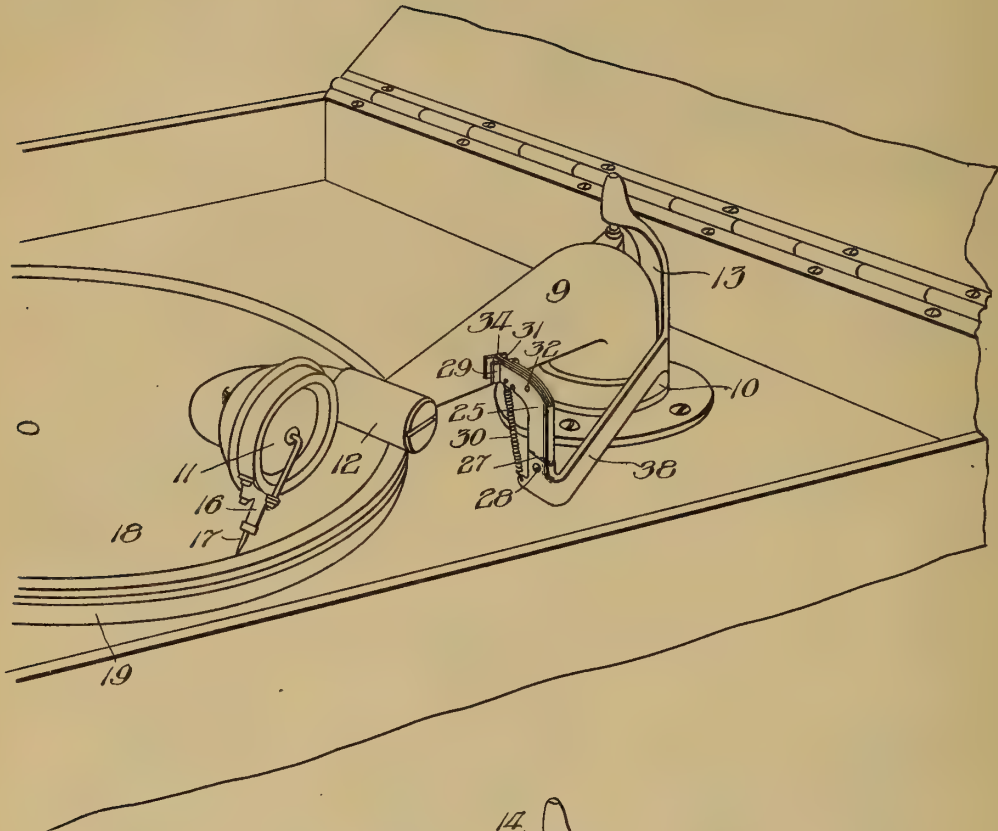
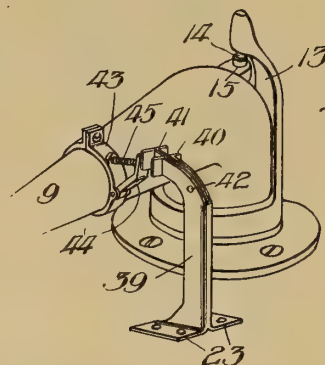


Fig. 8.



Witness:
Harry S. Gaither

Inventor:
Eugene F. McDonald Jr.
by *Banning & Banning*
Attys

UNITED STATES PATENT OFFICE.

EUGENE F. McDONALD, JR., OF CHICAGO, ILLINOIS.

PHONOGRAPHIC ATTACHMENT.

1,217,794.

Specification of Letters Patent. **Patented Feb. 27, 1917.**

Application filed June 26, 1916. Serial No. 105,991.

To all whom it may concern:

Be it known that I, EUGENE F. McDONALD, Jr., a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Phonographic Attachments, of which the following is a specification.

The attachment of this invention is designed to act as an adjustable stop member for limiting the outward throw of the tone arm of a phonograph, and for imparting a slight inward thrust thereto sufficient, when the disk record is in position and rotating, to throw the needle into engagement with the beginning of the record line.

In the operation of phonographs, difficulty and inconvenience is often experienced in setting the instrument in operation, which is due, on the one hand, to the tendency of the needle to fall down outside of the record and grind against the edge thereof before it is finally positioned on the surface of the disk; and when properly positioned on the surface, it often becomes necessary to manually move the needle inwardly in order to bring it into engagement with the beginning of the record line.

The present invention provides an adjustable stop for limiting the outward swing of the tone arm, which is made adjustable in order to accommodate the device to records of different diameters. The device, furthermore, embodies a spring-pressed member for inwardly thrusting the arm when the needle is positioned on the surface of the record, but with such a slight spring action that no transverse movement across the record will be occasioned until the record is rotated, the weight of the needle resting on a stationary record being sufficient to prevent movement under the impetus of the spring.

In the drawings:

Figure 1 is a perspective view of the tone arm, turntable, and associated parts of a Victor phonograph, shown by way of illustration, together with the device of the present invention;

Fig. 2 is a side view partly in section of the device adjusted for use in connection with a ten inch record and in its inwardly projected position;

Fig. 3 is a similar view showing the device adjustable for a twelve inch record and in its outwardly projected position;

Fig. 4 is a section taken on line 4—4 of Fig. 2, looking in the direction of the arrow;

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 3, looking in the direction of the arrow;

Fig. 6 is a slight modification with additional stop devices provided for use in connection with the smaller size records;

Fig. 7 is a perspective view similar to Fig. 1, showing a modified form of mounting for the device; and

Fig. 8 is a modification of the device of Fig. 1.

In the drawings, the device is shown as applied to a phonograph having a tone arm 9 of ordinary form, and mounted to swivel within a socket 10 screwed or otherwise secured to the top of the phonograph casing. The arm 9 carries the usual sound box 11 which swivels up and down within a bearing 12 on the free end of the tone arm, which is a standard mode of construction. The arm is further supported in its in and out swivel movements by means of a standard 13 which springs from the socket 10, and carries at its upper end a pin 14 which enters a bearing 15 located on the bend of the tone arm. The sound box carries the usual needle socket 16 which receives the end of a needle 17, which latter bears downwardly on the surface of the disk record 18 carried by the turntable 19 in the usual manner.

In the above arrangement, the working parts serve merely for purposes of illustration, being those which are employed in the Victor phonograph, although the present invention is adapted for use with any make of phonograph employing parts corresponding in the main with those previously described.

The attachment of the present invention, in the form shown in Fig. 1, employs a base standard 20 preferably made of sheet metal and bent to afford two side leaves 21 connected at the bend or angle 22, and spread at their lower ends 23—23 to afford a base for attachment to the top of the phonograph casing. The standard affords a mounting for a rocking stop member 24 which is like-

wise formed of sheet metal to form side leaves or sections 25 connected at the bend or angle 26. The side leaves or sections of the stop member at its lower end are extended in the center to afford pivot ears 27 which are struck inwardly to contact one another and to lie between the sections or leaves of the base standard 20, to which they are pivoted by means of a pivot pin 28.

The leaves or sections of the base member and stop member lie in the same plane, and the meeting edges of one or both of the members are cut or beveled to afford a slight clearance between the edges, so that the latter will not lie in complete edgewise contact with one another, but will rather allow for a slight rocking movement of the stop member sufficient to permit the latter to be moved from the initial position shown in Fig. 3 inwardly to the final position shown in Fig. 2. The arrangement, however, is one which affords means for limiting the movement in both directions, so that only enough movement will be permitted to swing the tone arm inwardly to the degree necessary to insure engagement of the needle with the record line. Since the blank marginal space on different records is variable, it is necessary that the degree of movement afforded to the rocking stop member be sufficient to swing the arm over a record having a maximum width of marginal blank.

The forward ends of the leaves or sections of the rocking stop member are outwardly bent or spread to afford contact flanges 29 adapted to bear against the side of the tone arm. It is desirable to give to these contact flanges a sufficient vertical dimension to accommodate the device to variations in the height of the tone arm above the floor surface of the phonographic casing.

In order to impart the inward thrust to the rocking stop member sufficient to move the needle across the rotating surface of the disk, a coil spring 30 is provided, one end of which is hooked into the base standard, and the other end into the rocking stop member, which arrangement will impart a limited inward thrust to the stop member and thus tend to swing the tone arm in toward the center. The amount of movement allowed to the rocking stop member need be very slight, since the stop may be located at such a position with respect to the pivotal center of the arm that the slight rocking movement will be sufficiently accentuated at the end of the arm to move the needle to the desired degree.

The above description applies to a rocking stop member designed only for use in connection with records of a single size, but in order to adapt the device for use with records of varying size, one or more extension stops are provided. Figs. 2, 3, and 4

illustrate the use of a single one of such extensions 31 which is carried between the leaves or halves of the rocking stop member, and is mounted to swing upon a pivot 32 located at or near the bend of the rocking stop member, which pivot permits the stop extension to be moved from the projecting or active position shown in Fig. 2 into the non-active or vertical position shown in Fig. 3, and in order to limit the retracted movement of the extension, the halves or leaves of the rocking stop member are inwardly struck at the proper point to afford stop lugs 33 against which the lower edge of the extension is adapted to strike when the limit of movement is reached. The movement in the opposite direction is limited by contact of the rear end of the extension member with the connecting bend or angle 26 of the rocking stop member.

The above is a simple and convenient arrangement for the stops, although cross pins or the like might be employed for a similar purpose. As shown in Figs. 2, 3, and 4, the extension of these figures is formed from a double thickness of metal, the sections being folded and pressed together into contact with one another. This arrangement permits the end portion of the two sections to be oppositely bent to afford companion stop flanges 34, although a single thickness of metal might be employed and a single stop flange provided without altering the character of the device in any material degree. Such a construction is shown in Fig. 6, in which three extension stop members 35, 36, and 37, respectively, are employed, each of which is provided with but a single stop flange extending in one direction only, and this construction may be employed where it is desired to adapt the device for use in connection with the small six and eight inch records now being manufactured and sold extensively.

Fig. 7 shows a slight modification in which the movable parts heretofore described are mounted upon a bracket arm 38 which is connected with and outwardly projects from the standard 13; and this arrangement may be considered more desirable where the phonograph is initially equipped with the device of the present invention, and where it is not deemed desirable to mar the woodwork of the case by the screw-holes required in attaching the device in the manner shown in Fig. 1.

In Fig. 8 is shown a slight rearrangement of the operating parts, although the general arrangement and mode of operation is quite similar. In Fig. 8 a stop member 39 is made rigid, although quite similar in shape and general arrangement to the articulated member previously described. The rigid member 39 is provided at its inner end with stop flanges 40 similar to those heretofore de-

scribed, and one or more extension stops 41 may be employed which are pivoted to the pivot pin 42 in a manner identical with that previously described. In fact the construction and arrangement of the stop device of Fig. 8 is precisely similar to that which would result if the joint of Figs. 1 to 6 were eliminated. In order, however, to afford the necessary spring action to insure contact of the needle with the record line, the tone-arm is provided with a clamping ring 43 which carries a hinged contact arm 44 which is contacted by a spring 45, the arrangement being one which serves to afford a thrust against the rigid stop member, and thereby tend to move the tone arm and needle across the surface of the disk when rotating.

In use the device of either of the forms described will be so located and positioned with respect to the tone arm that it will permit the needle to be dropped down onto the surface of the disk near the extreme edge thereof, but the parts are so arranged and proportioned as to prevent the arm from being swung outward sufficiently to drop the needle down past the edge of the disk, the device affording a stop which insures contact with the surface of the disk. Thereafter when the operator releases the arm, the slight spring action afforded will serve to move the needle sufficiently to engage the beginning of the record line. Where records of different sizes are employed, the extension stops can be used and instantly adjusted to meet the changed conditions, so that the instrument can be operated without the trouble and annoyance which is frequently experienced in the effort to properly adjust the needle to the surface of the record. This is particularly noticeable where insufficient light is afforded to enable the operator to clearly ascertain the position of the needle. In the present case, however, accidental displacement of the needle is prevented and immediate contact with the beginning of the record line is insured, irrespective of the width of the blank marginal space which varies considerably in different records.

Although the device has been described with considerable particularity as to detail, it is obvious that the device need not be made of sheet metal in precisely the way described, and various modifications in structure and detail may be made without departing from the spirit of the invention.

I claim:

1. In combination with a swinging tone arm, needle and associated parts of a phonograph, a main stop device adapted to limit the outward swing of the arm to insure contact with the record surface, and an extension stop pivoted to the main stop device and adapted when moved to projected position to lie in acting relation with the tone arm and adapted to be swung at will on its

pivot to retracted position to expose the main stop device to co-act with the tone arm, substantially as described.

2. In combination with a swinging tone arm, a needle, and associated parts of a phonograph, a stop device pivoted in position to swing toward and from the record and restricted in its outward movement to limit the outward swing of the arm to insure contact of the needle with the record surface, and a spring for normally holding the stop device in its inward position for inwardly thrusting the tone arm to insure engagement of the needle with the beginning of the record line, substantially as described.

3. In combination with a swinging tone arm, a needle, and associated parts of a phonograph, a stop device pivoted on a horizontal pivot in position to swing toward and from the record and restricted in its outward movement to limit the outward swing of the arm to insure contact of the needle with the record surface, a spring for normally holding the stop device in its inward position for inwardly thrusting the tone arm to insure engagement of the needle with the beginning of the record line, and an extension stop connected to the stop device and movable into projected or retracted positions, and adapting the device for use with records of different sizes, substantially as described.

4. In combination with a swinging tone arm, needle, and associated parts of a phonograph, a pivoted stop device adapted to limit the outward swing of the arm to insure contact of the needle with the record surface, a spring for imparting an inward movement to the stop device for inwardly thrusting the tone arm to insure engagement of the needle with the beginning of the record line, and an extension stop pivoted to the stop device and adapted to be moved at will into projected or retracted position, and adapting the device for use with records of different sizes, substantially as described.

5. In combination with a swinging tone arm, needle, and associated parts of a phonograph, a stop device consisting of a base supporting member, a rocking stop pivoted to the base member and adapted to bear against the tone arm and to limit the outward movement of the arm, and a spring for inwardly rocking the stop member to insure contact of the needle with the beginning of the record line, substantially as described.

6. In combination with a swinging tone arm, needle, and associated parts of a phonograph, a stop device consisting of a base supporting member, a rocking stop pivoted to the base member and adapted to bear against the tone arm and to limit the outward movement of the arm, and a spring for inwardly rocking the stop member to insure contact of the needle with the beginning

of the record line, the spring having sufficient tension only to rock the stop when the needle is in contact with a rotating record, substantially as described.

5 7. In combination with a swinging tone arm, needle, and associated parts of a phonograph, a stop device consisting of a base supporting member, a rocking stop pivoted to the base member and adapted to bear
10 against the tone arm and to limit the outward movement of the arm, a spring for inwardly rocking the stop member to insure contact of the needle with the beginning of the record line, and an extension
15 stop connected to the rocking stop and adapted to be moved at will into and out of extended position, and adapting the device for use with records of different sizes, substantially as described.

20 8. In combination with a swinging tone arm, needle, and associated parts of a phonograph, a stop device consisting of a base supporting member, a rocking stop pivoted to the base member and adapted to bear
25 against the tone arm and to limit the outward movement of the arm, a spring for inwardly rocking the stop member to insure contact of the needle with the beginning of the record line, and an extension stop piv-
30 oted to the rocking stop and adapted to be moved at will into and out of extended position, and adapting the device for use with records of different sizes, substantially as described.

35 9. In combination with a swinging tone arm, needle, and associated parts of a phonograph, a stop device consisting of a base supporting member formed of two sections or

leaves connected together, a rocking stop of over-hanging formation consisting of two
40 sections or leaves connected together, and provided with pivot ears struck inwardly and pivoted between the sections of the base member, the adjoining edges of the two
45 members acting to limit the rocking movement of the stop member in both directions, and a spring connecting the rocking stop member with the base member for imparting an inward thrust to the rocking stop
50 member, substantially as described.

10. In combination with a swinging tone arm, needle, and associated parts of a phonograph, a stop device consisting of a base supporting member formed of two sections
55 or leaves connected together, a rocking stop of over-hanging formation consisting of two sections or leaves connected together, and provided with pivot ears struck inwardly and pivoted between the sections of the base
60 member, the adjoining edges of the two members acting to limit the rocking movement of the stop member in both directions, a spring connecting the rocking stop member with the base member for imparting an
65 inward thrust to the rocking stop member, and an extension stop pivoted between the leaves or sections of the rocking stop member and adapted to be moved either to a projected or retracted position to adapt the device
70 for use with records of different sizes, substantially as described.

EUGENE F. McDONALD, JR.

Witnesses:

SAMUEL W. BANNING,
FRANCES M. FROST.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

AUTOMATIC ELECTRIC WINDER FOR
SPRING MOTORS,

#1,217,843-----W.G.Shelton,

Patented-February 27th, 1917.

Filed-November 23rd, 1916.

W. G. SHELTON.
 AUTOMATIC ELECTRIC WINDER FOR SPRING MOTORS.
 APPLICATION FILED NOV. 23, 1916.

1,217,843.

Patented Feb. 27, 1917.

Fig. 1.

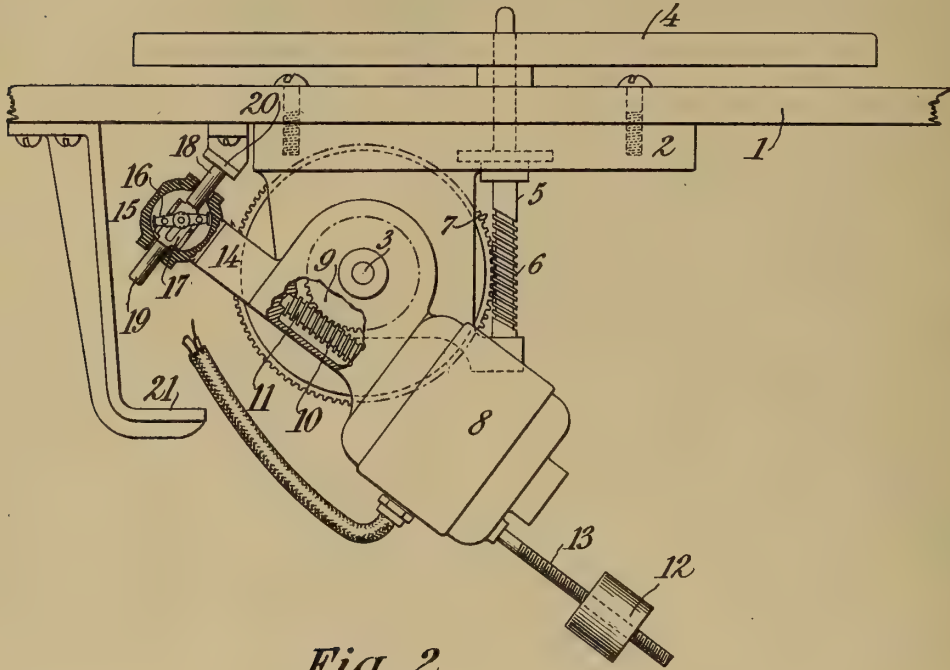
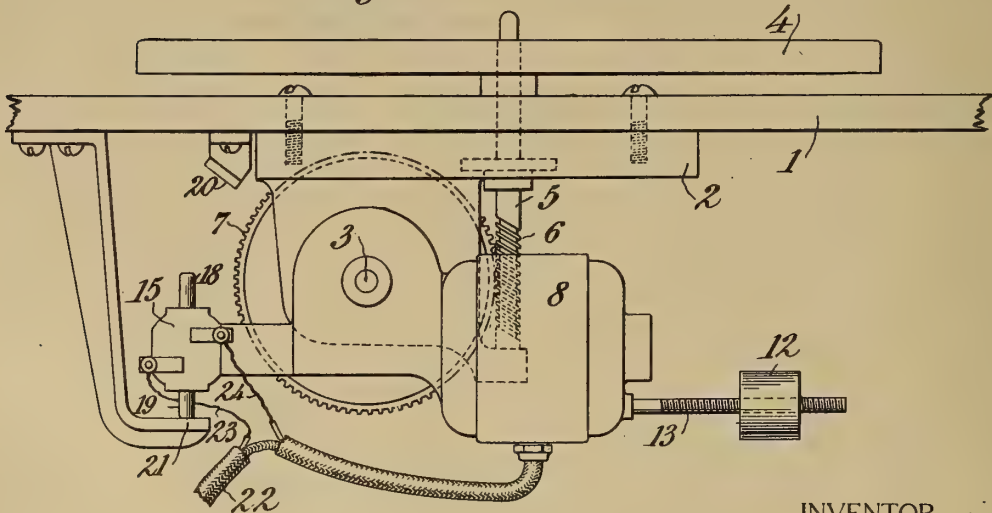


Fig. 2.



WITNESSES:

René Gruenl
J. F. Wallace

INVENTOR :

William Gentry Shelton

By Attorneys,

Fraser, Tink & Myers

UNITED STATES PATENT OFFICE.

WILLIAM GENTRY SHELTON, OF NEW YORK, N. Y.

AUTOMATIC ELECTRIC WINDER FOR SPRING-MOTORS.

1,217,843.

Specification of Letters Patent. Patented Feb. 27, 1917.

Application filed November 23, 1916. Serial No. 133,062.

To all whom it may concern:

Be it known that I, WILLIAM GENTRY SHELTON, a citizen of the United States of America, residing in the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Automatic Electric Winders for Spring-Motors, of which the following is a specification.

10 This invention relates to automatic means for controlling the current of an electric motor, particularly when connected with the winding up of some mechanism, as for instance, with the winding up of a spring motor. The invention is peculiarly useful in connection with an automatic winder for the spring motor of a talking machine, and is adapted to close the circuit of the electric motor upon the running down of the spring of the spring motor and the opening of such circuit upon the winding up of such spring to a predetermined tension.

In the drawings accompanying this application,—

25 Figure 1 is an elevational view partly in section of my invention shown in connection with certain parts of a talking machine, the parts being shown in the closed circuit position;

30 Fig. 2 is a similar view showing the parts in the position assumed when the spring of the spring motor is wound up and the circuit closed.

Referring to the drawings, 1 indicates the table of a talking machine, to the underside of which table is fastened the bed plate 2 of a spring motor. For the purposes of illustration, the motor and associated parts are shown as of a well known commercial type. 40 The winding shaft of the spring motor is indicated by the reference character 3. A talking machine turntable 4 is illustrated upon a spindle 5 having thereon a worm 6 meshing with a worm wheel 7 in operative relation with the spring of the motor.

45 In the operation of talking machines, it is quite desirable that the spring of the motor be kept sufficiently wound up to rotate the record disk, and it is further desirable that the tension of the spring be maintained between certain predetermined limits of tension, and that the spring be automatically wound up when it falls below a predetermined minimum less than that at which the spring should be maintained. It has been proposed to operate talking ma-

chines by means of electric motors for certain records. However, a spring motor gives more desirable results. My improved device, made the subject matter of this application, is particularly designed for automatically keeping the spring at the desired tension. To accomplish this result I provide an electric motor indicated in a general way by the reference character 8. The frame of the motor is mounted to oscillate upon the winding shaft 3, which shaft is shown having fast upon it a worm wheel 9 meshing with a worm 10, formed on the motor shaft 11. The organization of parts is such that upon the current circuit of the motor being closed, the rotary part of the motor will rotate the shaft 11 and by means of the worm 10 and worm wheel 9 the winding shaft will be rotated and the spring thereby wound up. The parts are so adjusted as to weight that when the spring of the spring motor runs down sufficiently to reduce the tension a predetermined amount, the weight of the motor and its associated parts causes the motor to assume the position indicated in Fig. 1. When the winding motor winds up the spring and gives it a certain predetermined amount of tension, the spring causes the motor to turn on the axis of the shaft 3 and assume the position illustrated in Fig. 2.

For the purpose of effecting the desired adjustment or regulation of tensions, an adjustable weight is provided. This is illustrated in the form of a weight 12 running upon a screwthreaded spindle 13 extending from the rear end of the electric motor casing.

90 The circuit of the motor is controlled by the change in position of the motor and its associated parts. A switch or circuit closer is so arranged in relation to the movable parts of the motor that an excursion caused by lowering of the tension of the spring closes the circuit, and an excursion caused by the tightening of the spring opens the circuit. The casing of the motor 8 is shown having an extension 14 beyond the shaft 3, which extension is shown carrying a commercial form of through switch 15. The interior construction of this switch is illustrated in Fig. 1 wherein the switch lever is indicated at 16, this switch lever being operated in the well known manner by means of a plate 17 having fast with it two pins 18 and 19. The pin 18 is operated by the motor

assuming the run down or Fig. 1 position by engagement of a tappet or actuator 20, and the pin 19 is engaged by the motor assuming the wound up or Fig. 2 position by engaging a tappet or actuator 21. The switch as illustrated in Fig. 1 is shown in its circuit closing position.

Of course, it is obvious that the actuators for the switch or circuit closer may be varied in position for the purpose of adjusting the timing of the functioning of the various parts. It is also apparent that the form of switch shown is for the purpose of illustrating the invention. As a matter of fact the entire showing of the drawings is illustrative but, nevertheless, of a practicable and efficient form of mechanism.

Although the invention is rather simple, it may be desirable to briefly outline its operation. It is assumed that the cable 22 is connected up with some suitable source of electric current and that the parts are in the Fig. 2 position. Operation of the talking machine permits the spring thereof to run down and its tension to be lessened, the tension of the spring being the force holding the parts in the Fig. 2 position. Upon the weakening of the tension of the spring of the spring motor, the winding device oscillates upon its axis and the parts assume the Fig. 1 position, the pin 18 striking the abutment 20 and forcing the plate 17 in a downward direction thereby moving the switch lever to close the circuit of the motor through the wires 23, 24. The parts remain in this position until the spring of the motor almost reaches the maximum desired tension, which maximum limit is adjusted by adjusting the weight 12 upon the screw rod 13. When the tension of the spring which is being wound overbalances the winding motor apparatus, the parts assume the Fig. 2 position, the pin 19 engaging the abutment 20 and forcing the plate 17 in an upward direction and moving the switch lever 16 into an open circuit position, thereby cutting off the current of the motor, which current remains cut off until such time as the tension of the spring is again lowered to the predetermined minimum.

I claim—

1. In a device of the character specified, the combination with a spring motor having a winding shaft, of an electric motor oscillatably mounted upon such winding shaft, connections between the electric motor shaft and the winding shaft, whereby the rotation of the electric motor rotates the winding shaft, and an electrical switch for opening

and closing the circuit of the said electric motor upon the respective excursions or oscillation thereof.

2. In an automatic electric winder for a spring motor, the combination with a pivotally supported electric winding motor, means for connecting the motor shaft with the winding shaft of a spring motor, whereby upon the weakening of the tension of the spring of said spring motor, the winding motor assumes one position, and upon the tightening of the tension of the spring to a predetermined extent, the winding motor assumes another position; an electric switch in the circuit of the said winding motor, and means for actuating the switch at the limit of the respective excursions for closing and opening the circuit respectively.

3. In an automatic electric winder for a spring motor, the combination with a pivotally supported electric winding motor, means for connecting the motor shaft with the winding shaft of a spring motor, whereby upon the weakening of the tension of the spring of said spring motor, the winding motor assumes one position, and upon the tightening of the tension of the spring to a predetermined extent, the winding motor assumes another position; an electric switch in the circuit of the said winding motor, means for actuating the switch at the limit of the respective excursions for closing and opening the circuit respectively, and means for adjusting the winder to vary the amount of spring tension to which it will respond.

4. In an automatic electric winder for a spring motor, the combination with a pivotally supported electric winding motor; means for connecting the motor shaft with the winding shaft of a spring motor, whereby upon the weakening of the tension of the spring of said spring motor, the winding motor assumes one position, and upon the tightening of the tension of the spring to a predetermined extent, the winding motor assumes another position, an electric switch in the circuit of the said winding motor, means for actuating the switch at the limit of the respective excursions for closing and opening the circuit respectively, and an adjustable weight carried by the winding motor for varying the amount of spring tension to which the winder will respond.

In witness whereof, I have hereunto signed my name.

WILLIAM GENTRY SHELTON.

Witness:

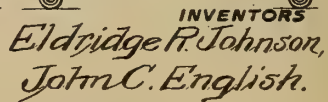
CHAS. LYON RUSSELL.

TALKING MACHINE,
#1,217,869-----E.R.Johnson & J.C.English,
Patented-February 27th, 1917.
Filed-April 23rd, 1915.

APPLICATION FILED APR. 23, 1915.

Patented Feb. 27, 1917.

3 SHEETS—SHEET 1.



BY Fulton & Blount

ATTORNEYS



E. R. JOHNSON & J. C. ENGLISH.

TALKING MACHINE.

APPLICATION FILED APR. 23, 1915.

1,217,869.

Patented Feb. 27, 1917.

3 SHEETS—SHEET 2.

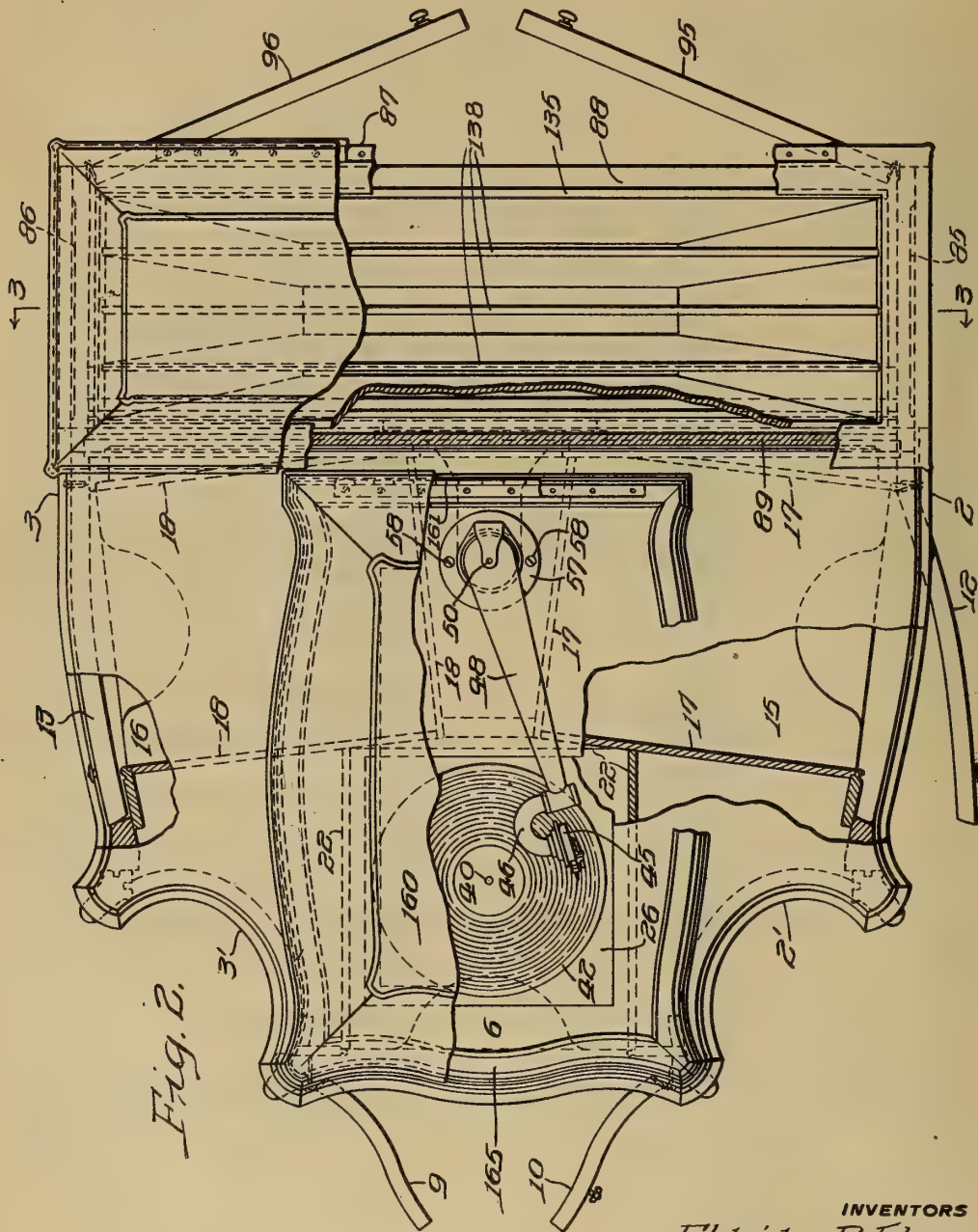


Fig. 2.

WITNESS

F. J. Hartman.

BY

Auton & Blount

ATTORNEYS

INVENTORS
Eldridge P. Johnson,
John C. English.

E. R. JOHNSON & J. C. ENGLISH.

TALKING MACHINE.

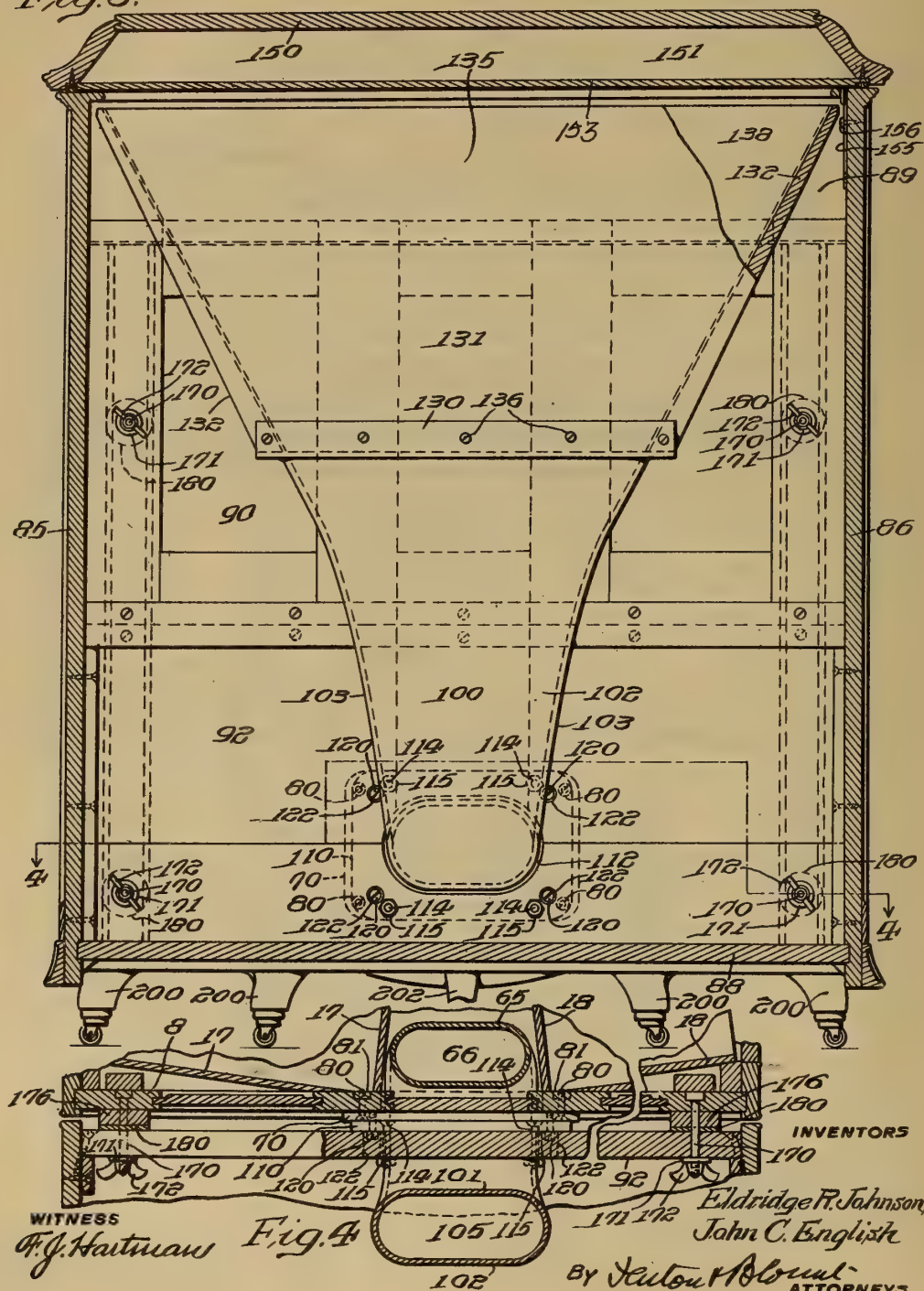
APPLICATION FILED APR. 23, 1915.

Patented Feb. 27, 1917.

3 SHEETS—SHEET 3.

1,217,869.

Fig. 3.



UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF MERION, AND JOHN C. ENGLISH, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

TALKING-MACHINE.

1,217,869.

Specification of Letters Patent.

Patented Feb. 27, 1917.

Application filed April 23, 1915. Serial No. 23,299.

To all whom it may concern:

Be it known that we, ELDRIDGE R. JOHNSON and JOHN C. ENGLISH, citizens of the United States, and residents, respectively, of Merion, county of Montgomery, and State of Pennsylvania, and of the city of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification, reference being had to the accompanying drawings.

Among the principal objects of our invention are to provide a talking machine having amplifying means of relatively great size, and a long, preferably tapering, sound-conveyer interposed between the amplifying means proper and the sound-reproducing means; to provide a talking machine of this character comprising a hollow, preferably tapering, separable sound-conveyer having a minimum number of joints; to provide a talking machine comprising a plurality of separate chambers, respectively housing the actuating mechanism, the major portion of the sound-conveying means, and the amplifying means; to provide a talking machine having sound wave deflecting means whereby the sound waves will be amplified and their tonal qualities improved as they issue from the talking machine; and to provide a talking machine having relatively large, vertically opening amplifying means and a sounding-board, or sound-wave deflecting means, so disposed with relation to the mouth of said amplifying means as to deflect the sound waves issuing therefrom toward the front part of the talking machine.

Further objects of our invention are to provide a talking machine of relatively large size having a cabinet which may be readily taken apart by a person unfamiliar with talking machines and without disturbing or disarranging any of the operative parts of the device, for the purpose of more readily moving or transporting the machine, and especially for the purpose of permitting the machine to be readily passed through a door of ordinary width; and to provide a talking machine having a cabinet so constructed as to afford a maximum storage space for records and other accessories, and which shall be of a pleasing and attractive appearance.

Our invention further includes all of the other various novel features of construction and arrangement hereinafter more definitely specified.

In the accompanying drawings, Figure 1 is a central, longitudinal, vertical section of a talking machine, constructed in accordance with one form of our invention; Fig. 2 is a top plan view thereof, certain portions being broken away for the sake of clearness; Fig. 3 is a transverse, vertical section thereof, taken on line 3—3 in Fig. 2, looking in the direction of the arrows, certain portions being shown in elevation for the sake of clearness; and Fig. 4 is a fragmentary, transverse, horizontal section taken on line 4—4 in Fig. 3, looking in the direction of the arrows.

Generally speaking our invention may be said to comprise a cabinet having its side walls so arranged that the front portion of the cabinet is of materially less width than the rear portion, the cabinet being transversely separable and provided adjacent the line of separation with a pair of vertically extending partitions arranged one on each side of said line, that portion of the cabinet in front of the partitions serving to house the actuating mechanism of the talking machine and a considerable portion of the sound-conveying means, as well as affording space for the storage of records and other supplies; and that portion of the cabinet in the rear of the partitions serving to form a compartment for the reception of another portion of the sound-conveying means, as well as the relatively large amplifying means, and to support the sound-deflecting means, the cabinet as well as the sound-conveying means being so constructed as to be readily separable adjacent the partitions.

Referring now to the drawings, in which is illustrated one embodiment of our invention, and for convenience of description considering momentarily only that portion thereof in front of the transverse dividing partitions hitherto referred to, the same comprises a cabinet having a suitable frame 1, side walls 2 and 3, bottom 5, top 6, front 7, and rear wall or partition 8, the latter forming one of the said dividing partitions when the whole cabinet is assembled. The front of the cabinet is provided with doors 9 and 10, so arranged as to readily give ac-

cess to the interior thereof, and the side walls of the cabinet may preferably be formed in curvilinear contour, as best shown in Fig. 2, the major portion of the side walls extending forward from the rear wall 8, of the cabinet for a considerable distance substantially normal thereto, and thereafter being constricted inwardly in a suitable curve or other pleasing configuration as at 2' and 3', in such manner that the extreme forward portion of the cabinet will be of considerably less width than the major portion thereof. Suitable apertures may be provided in the side walls, preferably in the rear of the sharply curved portions 2' and 3' thereof, and closed by suitable doors 12 and 13, whereby access may be readily obtained to the interior of the cabinet which may, in the rear of the said doors, be provided with a plurality of suitable horizontal shelves 15 and 16, arranged one above the other, and preferably surrounded and inclosed on three sides by suitable vertical partitions 17 and 18, the sides of the shelves being substantially normal to the general direction to that portion of the side walls in the rear of which the shelves are located. A plurality of other suitable horizontal shelves 20, may also be provided in the rear of the aperture closed by the doors 9 and 10, access to the said shelves being readily obtained by opening the doors, the shelves being also preferably inclosed by suitable vertical partitions 22. For convenience in manufacture the various sets of shelves with their adjacent partitions may be constructed as integral units separate from the cabinet proper, and thereafter secured in position therein by means of suitable fastenings so as to be maintained in permanent fixed relation relatively thereto, and by arranging the various shelves substantially in the manner hereinbefore described, a maximum amount of readily accessible storage space suitable for holding sound records and the like, is obtained without in any manner detracting from the appearance, or tonal qualities of the talking machine.

A suitable aperture 25, in the top 6, of the cabinet affords space for the reception of the motor board 26, suitably supported therein as by the cleats 28, and from which is suspended a suitable motor or other actuating means 30, which may be of any desired or preferred construction, and which may be preferably inclosed in a compartment 32, suitably formed within the cabinet by the partitions 34 and 35, and bottom board 37. The motor may be provided with an upwardly extending shaft 40, passing through a suitable aperture in the motor board, and carrying the rotatable turntable 41, which serves as a support for the sound record 42, in the usual manner. A sound reproducer 45, of any desired or preferred

construction is provided and preferably attached to a U-shaped tube or gooseneck 46, in turn connected with the preferably tapering tone arm 48, extending toward the rear of the cabinet, and supported in such manner as to permit its free horizontal movement, as, for instance, by a suitable bracket 49, and pivot 50, in the well-known manner.

The bracket 49, may preferably be provided with a downwardly extending tubular extension 55, of a length sufficient to extend substantially through the top 6, upon which the bracket is supported by an outwardly extending preferably annular flange 57, provided with suitable apertures for the reception of screws 58, which pass through the flange and engage in other suitable preferably internally threaded apertures in a flange 60, formed upon the upper end of the downwardly extending sound-conveyer 65, consisting preferably of a single casting providing a suitable slightly tapering internal passage-way 66. While this portion of the sound-conveyer may be of any desired shape, it is preferably formed so that the upper end thereof will be somewhat forwardly off-set from the lower portion which, adjacent its lowermost extremity, is turned rearwardly through an angle of substantially 90 degrees, and provided with a suitable transversely extending flange 70, for a purpose to be hereinafter described. It will be evident that when the screws 58, are positioned in the flanges 57 and 60, that the upper end of the sound-conveyer will be maintained in rigid relation with the bracket 49, and communication afforded between the interior of the sound-conveyer and the interior of the tone arm 48, whereby the sound waves traveling from the latter will readily pass into the former.

The rear wall or partition 8, of this portion of the cabinet extends between the side walls thereof and from the top of the cabinet to the bottom, and is provided with a suitable aperture 77, for the passage of the sound-conveyer 65. This partition, as well as other of the partitions and walls of the cabinet, may comprise a plurality of suitable relatively thin panels as indicated in the drawings, set in a more rigid surrounding frame work in order to lighten the construction of the cabinet, and in certain instances to produce a more resonant structure; and it will be understood that in the construction of the cabinet generally, the use of such panels and of suitable strengthening braces and cleats in the manner well understood by persons familiar with the art may be resorted to when considered necessary or desirable.

The flange 70, upon the lower end of the sound-conveyer 65, is provided with a plurality of suitable apertures for the recep-

tion of the bolts 80, provided with nuts 81, whereby the flange may be secured in fixed relation to the partition 8, and upon the rear side thereof, as clearly shown in Figs. 1 and 4, thus maintaining this portion of the sound-conveyer in rigid operative relation to the front portion of the cabinet, and in a chamber therein separate from the actuating mechanism.

Referring now to that portion of the cabinet in the rear of the dividing partitions the same may comprise side walls 85 and 86, rear wall 87, bottom 88, and front wall 89, the side and rear walls being the full height of this portion of the cabinet, which preferably extends somewhat above the top 6, of the front portion. The front wall 89, however, merely extends from above the top 6, sufficiently far to bring its upper extremity into the same horizontal plane as the extremities of the side and rear walls, and is preferably so arranged, by means of a suitable forwardly extending off-set in the side walls, that it will slightly overhang the rear edge of top 6, as clearly shown in Fig. 1. Extending across the front of this portion of the cabinet is the vertical partition 90, corresponding to the partition 8, previously described, the lower portion 92 thereof being preferably formed of relatively thick material, as best shown in Fig. 1, for the purpose of securely supporting another portion of the sound-conveyer, as well as the amplifying means proper. The extreme rear wall 87 may be provided with a suitable opening closed by suitable outwardly opening doors 95 and 96, to afford access to the interior of this portion of the cabinet.

Within the chamber formed in the rear portion of the cabinet is located an upwardly extending portion of the sound-conveyer, together with the amplifying means proper, the former being preferably formed of a single casting 100, and providing front and rear walls 101 and 102, slightly diverging in an upward direction, and side walls 103, also upwardly diverging, but at a considerably greater angle, whereby a sound-conducting passage 105, is formed therein, substantially rectangular in horizontal section and of increasing area toward the upwardly projecting mouth. The lower end of this portion 100, of the sound-conveyer, may, as best shown in Fig. 1, be turned substantially at right angles to the main portion thereof, and provided with a transversely extending flange 110. A suitable aperture 112, is provided in the thickened portion 92 of the partition 90, and through this aperture the sound-conveyer extends and is secured in fixed relation with the partition by means of bolts 114, and nuts 115, which pass through suitable holes in the partition and in the flange 110, in such manner that the flange will abut against the

front side of the partition in opposition to the flange 70, previously described. The flange 110 is also provided with other suitable apertures for the passage of a plurality of screws 120, which engage in other threaded apertures in the flange 70, and serve to maintain the two flanges face to face when in assembled position, so that the two portions of the sound-conveyer may be rigidly maintained in fixed relation and a continuous passage for the sound waves provided therethrough. The screws 120 may be of sufficient length to pass directly through the partition, as well as the flange, or suitable apertures 122, may be provided in the former for their reception, as best shown in Fig. 4. Of course it will be understood that the heads of the bolts 80 and 114, are countersunk below the surfaces of the respective flanges so that the latter will readily contact over their entire surfaces when in assembled relation.

The sound-conveyer may be provided adjacent its upper extremity or mouth with suitable flanges 130, to which the side walls 131, and end walls 132, of the upwardly extending amplifier 135, are secured, as by the screws or rivets 136, the walls terminating preferably adjacent the top of, but out of contact with, the cabinet.

The amplifier may also preferably be provided with a plurality of transverse partitions 138, either extending vertically upward therein or diverging, more or less depending upon the number and style of partitions used, and these partitions as well as the side and end walls of the amplifier may preferably be formed of wood or other resonant material, either of constant thickness, or tapered upwardly, as shown in connection with the side walls 131, in Fig. 3. If desired, however, any other form or type of amplifier may be employed, the same being preferably supported solely by the upwardly turned sound-conveyer, and having no connection whatsoever to any portion of the cabinet.

For the purpose of closing the open upper end of the rear portion of the cabinet, a lid 150, preferably having a depression or hollow 151, in its under side, may be provided and hinged, as by hinge 152, to the cabinet adjacent its rear edge, and a sounding-board or sound-deflector 153, consisting preferably of a thin sheet of wood or other resonant material may extend across the depression in the lid in such manner as to cover the entire under side of the latter. This sound-deflector or sounding-board may be of either constant thickness or else may be tapered from back to front or vice versa, as may be desired, and may preferably be secured in fixed relation with the lid. A suitable link 155, or other preferred means serves to hold the lid in raised position while

the machine is in operation in such manner that the sounding-board 153, is maintained in angular relation with the open mouth of the amplifier, whereby the sound waves issuing therefrom and impinging against the sounding-board, are thereby deflected from their initial upward direction forwardly toward the front part of the machine and simultaneously improved in tonal quality. When the machine is not in operation, or it is desired to greatly muffle the reproduction, the lid may be lowered by suitable manipulation of the link and of a catch 156, by which the position of the lid may be controlled.

For the purpose of covering the turntable and sound-reproducing mechanism, as well as of affording a more artistic finish to the cabinet, another lid 160, hinged at 161, is provided and designed to close against a suitable frame 165, secured to the top 6, of the forward portion of the cabinet, and surrounding those portions of the mechanism which project above the top. This lid may be maintained in raised position when desired by means of a suitable link 168, in the well-known manner.

A plurality of feet or legs 200, for the purpose of supporting the cabinet are provided and arranged at suitable points, and in practice it is desirable to provide one or more legs 201 and 202, located substantially along the median line of the cabinet and respectively beneath the front and rear portions thereof, for the purpose of affording a support to the sections of the cabinet when the latter is dis-assembled, as hereinafter described.

For the purpose of securing the front and rear portions of the cabinet in assembled relation, a plurality of rearwardly extending and suitably spaced bolts 170, are provided and so arranged that their forward ends are fixedly secured within the partition 8, from which point the bolts extend rearwardly for a sufficient distance to pass completely through the partition 90, or its thickened portion 92, as the case may be, when the cabinet is assembled, and afford space for the reception of the washers 171, and thumb nuts 172, upon their ends, which are suitably threaded for the reception of the latter, and for the purpose of maintaining the two partitions 8 and 90, in correctly spaced relation, vertically extending strips 176, secured to the partition 8 may be provided adjacent the bolts 170, and through which the latter preferably extend. If desired, a washer 180, of felt or other resilient material, may surround each bolt between the rear faces of the strips and the adjacent face of the partition 90.

It will thus be evident that, when the two portions of the cabinet are moved into operative relation, as shown in the drawings,

the bolts 170 will extend through the partition 90, or its thickened portion 92, as the case may be, and that by placing the thumb nuts 172 upon the ends of the bolts and tightening them down against the washers 171, the two portions of the cabinet may be rigidly secured together to form a unitary operative structure, the two portions of the sound-conveyer being similarly maintained in fixed relation by means of the screws 120 passed through the abutting flanges 70 and 110.

It will furthermore be evident that the front and rear portions of the cabinet may be readily separated when desired merely by removing the thumb nuts 172, washers 171, and screws 120, which operation may be readily accomplished when the doors 95 and 96, at the rear of the cabinet are opened, thus permitting the rear portion of the cabinet to be moved away from the front portion, to separate the machine into two self-contained and independent units, which may be easily transported and readily passed through a door of ordinary width, an operation which, owing to the relatively large size of the machine, would be impossible when the same is assembled for use. Furthermore, such separation of the two portions of the machine may be readily effected by a person entirely unfamiliar with talking machines, as it is accomplished without any interference whatsoever with the delicate operative parts of the device, and without even disturbing the records or other accessories within the storage spaces in the interior of the cabinet.

It will thus appear that we have provided a talking machine having amplifying and sound-conveying means of relatively large size, which is of pleasing appearance, and which comprises numerous novel features of construction and arrangement. Furthermore, owing possibly to the relatively large dimensions of the amplifier and the isolation of certain parts of the device in separate chambers, it has been found in practice that the reproduction of sound by a machine embodying the characteristics of our invention is extremely life-like and without disagreeable features, while being of great volume, so that a machine constructed in accordance with our invention is especially suitable, among other purposes, for reproducing sound in auditoriums and similar rooms of large size, and yet capable of ready transportation from place to place as may be required.

While we have described with considerable detail one embodiment of our invention, we do not desire to limit ourselves to the exact details of construction and arrangement thereof as herein set forth, as it will be evident that various changes may be made in the form and location of the various parts

of the device, and in numerous other details relative to the construction and arrangement thereof without departing from the spirit and scope of the invention as defined in the
5 appended claims.

Having thus described our invention what we claim and desire to protect by Letters Patent of the United States is:

1. In a talking machine, the combination
10 of a cabinet having front compartments and a rear compartment, a top, a partition separating said front and rear compartments, of actuating means in one of said front compartments below said top, sound-repro-
15 ducing means above said top, sound-conveying means extending through said top and through the other of said front compartments and through said partition, an upwardly projecting sound-amplifier in said
20 rear compartment, in operative communication with said sound conveying means and having its mouth adjacent the top of said rear compartment, a movable lid above said rear compartment, a movable cover inclos-
25 ing said sound-reproducing means, and means operative to permit the separation adjacent said partition of that portion of the cabinet comprising the rear compartment from that portion thereof comprising
30 the front compartments.

2. A talking machine comprising a cabinet having a plurality of vertically extending transverse partitions and having a plurality of separate compartments on one side
35 of said partitions and a single compartment on the other side of said partitions, actuating mechanism in one of said first-mentioned compartments, sound-conveying means in another of said first-mentioned
40 compartments and extending into said single compartment through said partitions,

sound-amplifying means in said single compartment supported by said sound-conveying means, and means whereby that portion
45 of said cabinet containing said actuating mechanism may be separated from that portion of said cabinet containing said sound-amplifying means on a plane extending between said partitions, and means whereby
50 said sound-conveying means may be similarly separated.

3. In a talking machine, the combination of a cabinet sub-divided by a partition, sound reproducing means and sound amplifying means carried by said cabinet on opposite sides of said partition, and sound
55 conveying means extending on both sides of said partition and connecting said reproducing means and said amplifying means, said cabinet and said conveying means being
60 each formed of separable sections united adjacent said partition.

4. In a talking machine, the combination of two separable units, means to rigidly secure said units together, a sound reproducing mechanism and a motor mechanism
65 within one of said units, a lid on the top of said unit to inclose and give access to said sound reproducing mechanism, an amplifier in the other of said units arranged to discharge sound upwardly, a lid on the top of
70 said last mentioned unit arranged when raised to form a deflector to direct the sound from said amplifier over said first mentioned unit, and a sound conveyer extending within said
75 units and connecting said sound reproducing means with said amplifier.

In witness whereof, we have hereunto set our hands these 13th and 21st days of April, 1915.

ELDRIDGE R. JOHNSON.
JOHN C. ENGLISH.



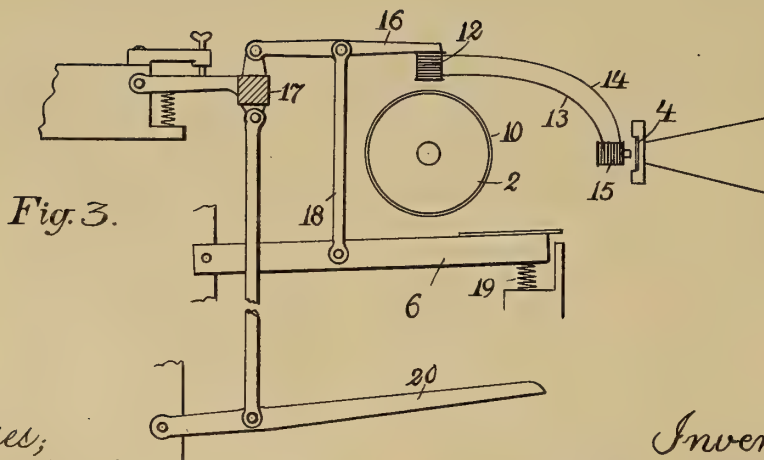
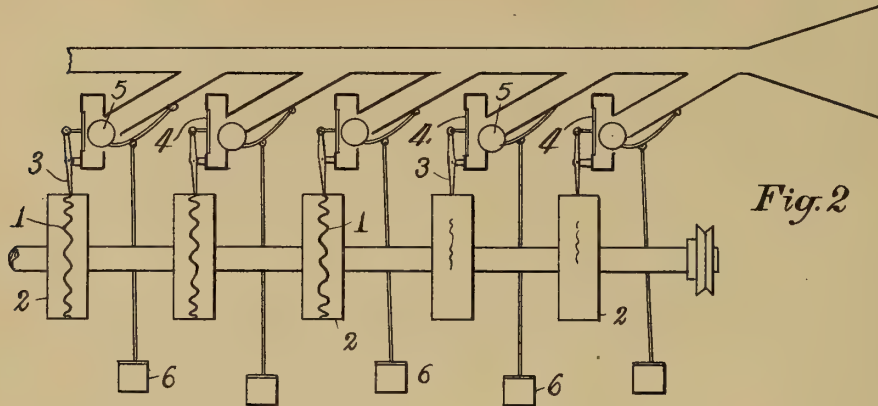
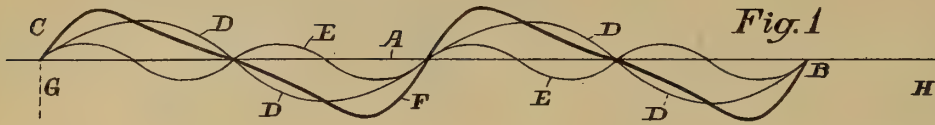
SOUND PRODUCING DEVICE,

1,218,324-----M.L. Severy,
Patented-March 6th, 1917.
Filed-March 22nd, 1913.

M. L. SEVERY.
SOUND PRODUCING DEVICE.
APPLICATION FILED MAR. 22, 1913.

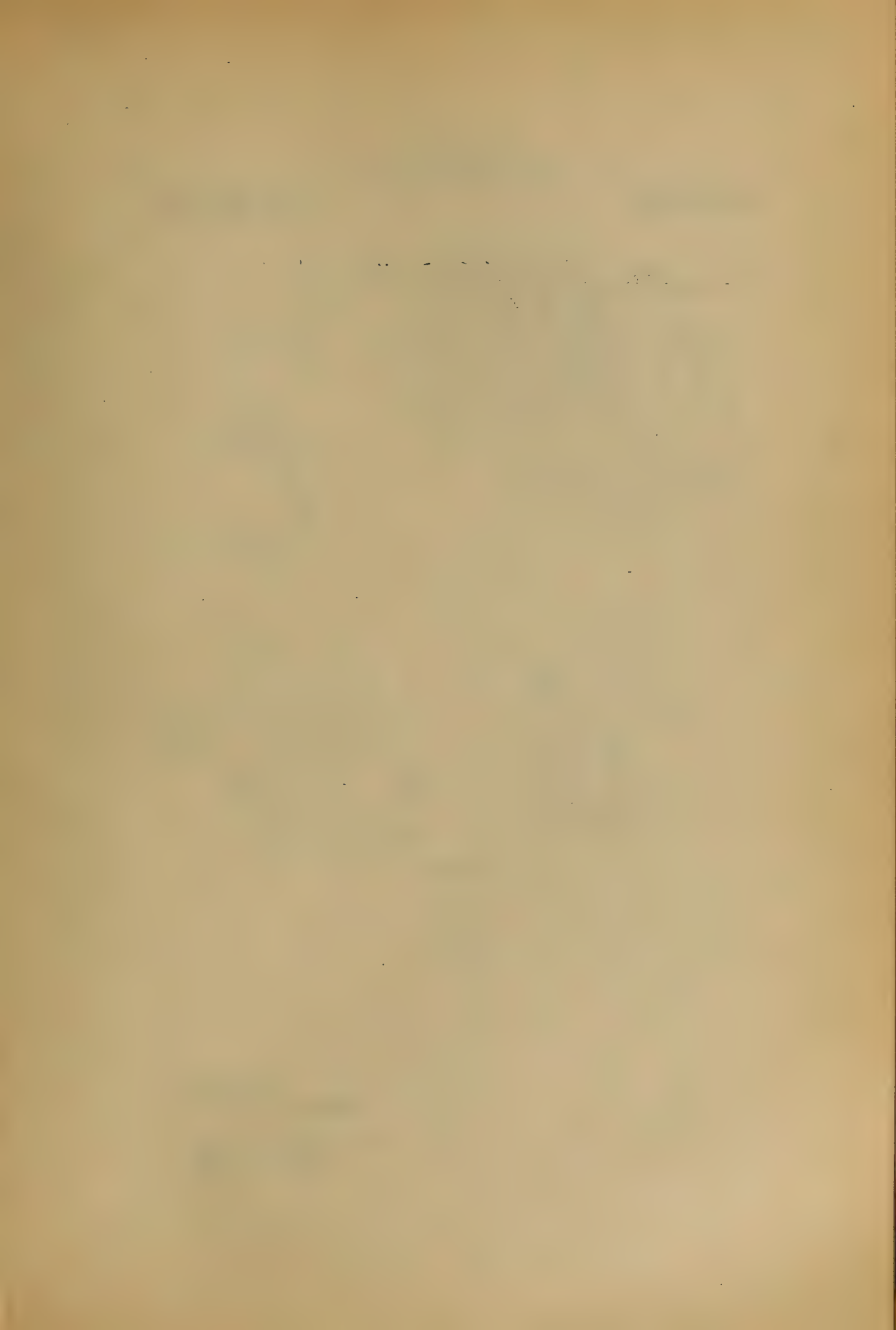
1,218,324.

Patented Mar. 6, 1917.
3 SHEETS—SHEET 1.



Witnesses;
E. H. Hitt
E. E. Wail-

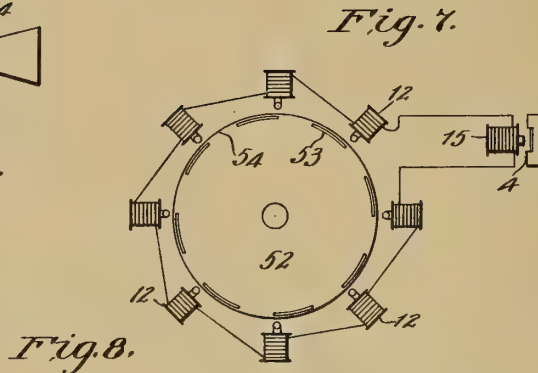
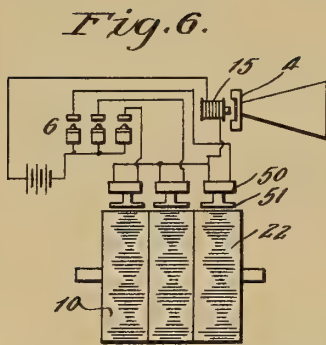
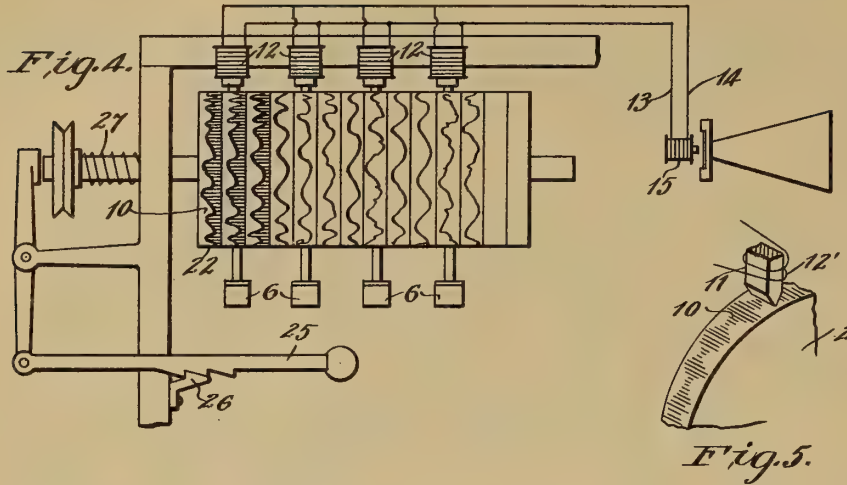
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Attorney



M. L. SEVERY.
SOUND PRODUCING DEVICE.
APPLICATION FILED MAR. 22, 1913.

1,218,324.

Patented Mar. 6, 1917.
3 SHEETS—SHEET 2.

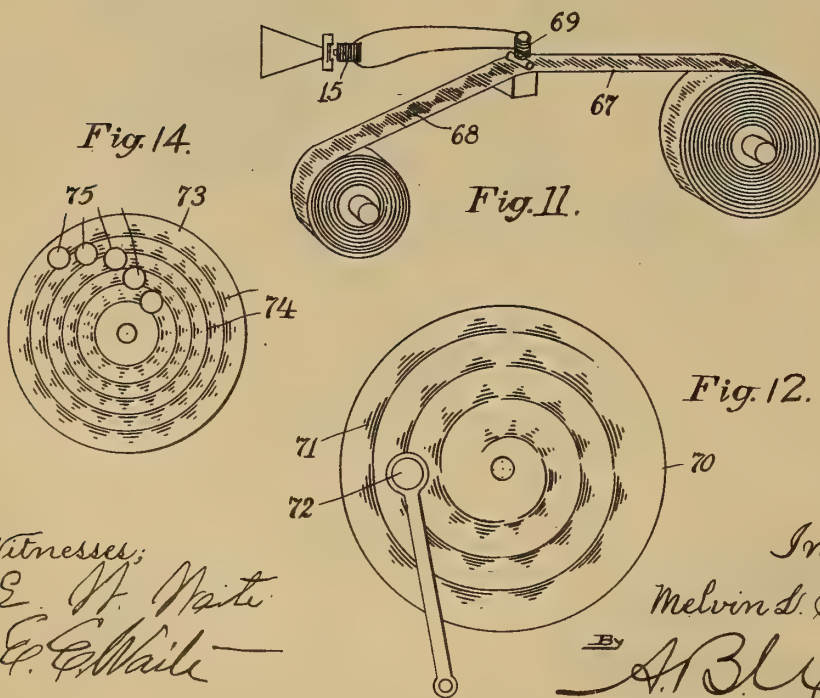
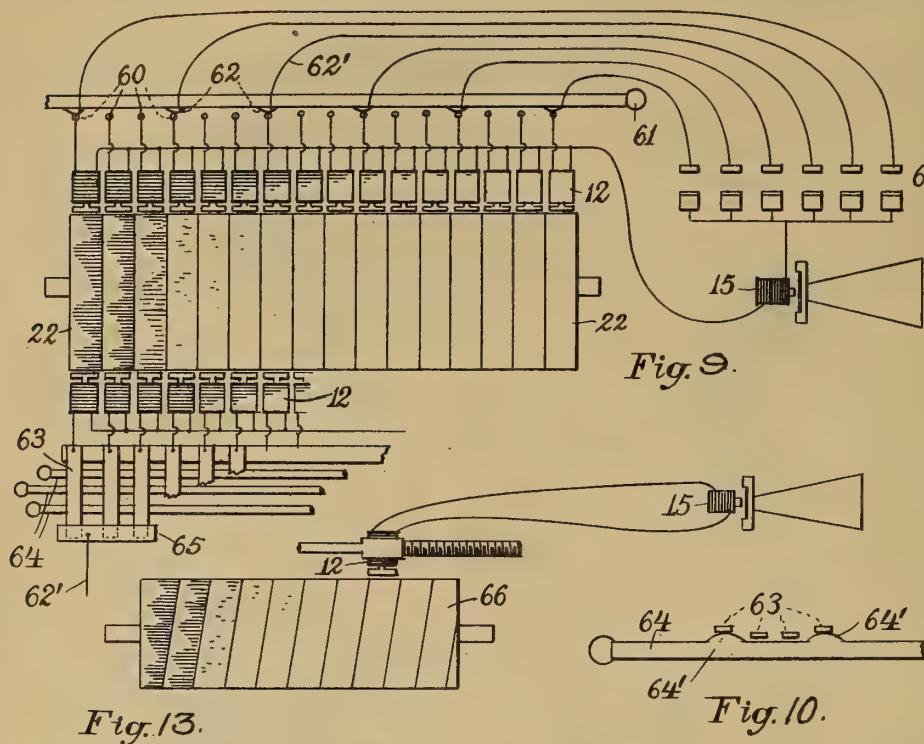


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SOUND PRODUCING DEVICE.
APPLICATION FILED MAR. 22, 1913.

1,218,324.

Patented Mar. 6, 1917.
3 SHEETS—SHEET 3.



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Attorney

UNITED STATES PATENT OFFICE.

MELVIN L. SEVERY, OF ARLINGTON HEIGHTS, MASSACHUSETTS.

SOUND-PRODUCING DEVICE.

1,218,324.

Specification of Letters Patent.

Patented Mar. 6, 1917.

Continuation of application Serial No. 357,978, filed February 18, 1907. This application filed March 22, 1913. Serial No. 756,169.

To all whom it may concern:

Be it known that I, MELVIN L. SEVERY, a citizen of the United States, and a resident of Arlington Heights, in the county of Middlesex and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Sound-Producing Devices, of which the following is a full, clear, and exact description.

10 The object of the present invention is the construction of an improved musical instrument in which the sonorous vibrations are produced electromagnetically by the movement of phonograms of magnetic material
15 past electromagnetic sound producing mechanism.

The complete device is a keyed instrument capable of delivering a wide range of tones varying both in quality and pitch. Subsidiary features of the invention are a magnetic
20 phonogram or timbre form of even surface and varying lateral extent and a special form of magnet pole piece for coaction with such timbre form, these devices being peculiarly adapted to the musical instrument
25 of the type herein described because they permit a ready tone control both by pedal and key action.

In the drawings:—

30 Figure 1 is a diagram graphically representing a sound vibration;

Fig. 2 is an elevation of a musical instrument embodying in a crude form the fundamental idea of the invention;

35 Fig. 3 represents in side sectional elevation a preferred embodiment of the invention;

Fig. 4 is a front elevation of the same;

40 Fig. 5 is a perspective view of one of the timbre form disks;

Fig. 6 is a diagrammatic view showing the use of microphones;

45 Fig. 7 is a diagrammatic view showing a multiple arrangement of electro-magnets or similar responsive devices;

Fig. 8 is a perspective view of a preferred form of magnet pole piece;

50 Fig. 9 is an elevation of a type of device embodying my invention, and in which a plurality of timbre forms differing in the quality of tone production but of the same

pitch are adapted to be operatively connected with the translating device singly or in any desired combination;

Fig. 10 is a detail view of certain of the features shown in Fig. 9;

Fig. 11 is a perspective view of a tape provided with timbre forms;

Fig. 12 is a face view of a disk having spirally disposed timbre forms;

Fig. 13 is a view of a cylinder having a helical arrangement of timbre forms; and

Fig. 14 is a face view of a disk having a series of concentric circular timbre forms.

In Fig. 1 which is the graphic representation of certain sound vibrations A represents a string stretched between the points B and C. D represents the string when vibrating with three nodal points and E the string vibrating with seven nodal points, these being two of the string's harmonics. When the string is vibrated to produce both harmonics simultaneously its resultant form is that shown in the heavy line F.

By engraving an endless groove 1 patented after this line F in the periphery of a disk 2 (Fig. 2), and having one end of a small lever 3 engage such groove with its opposite end connected with the diaphragm 4 of a gramophonic reproducer, the rapid rotation of said disk will cause the reproducer to emit a musical tone embracing the two harmonics illustrated, the pitch depending upon the speed of rotation of the disk.

The disk being in continuous motion, with a damper 5 normally pressed against the diaphragm 4, no music will be heard except when such damper is removed as by the depression of a key 6. By a duplication of such devices, as is indicated in Fig. 2, but with the grooves 1 suitably varied in distances from crest to crest, a musical instrument may be produced capable of any desired range of melody and harmony. The device of Fig. 2 is illustrated merely to make clear the fundamental idea of my invention and the availability of timbre forms derived empirically or graphically as contradistinguished from sound records.

In my preferred construction I use a superficially variable acoustic timbre form 10 upon the smooth periphery of the disk 2

as shown in Fig. 5, composed of some magnetic substance, or magnetically attractive substance and rotated in close proximity to a magnet whose pole 11 is laterally extended.

5 The magnetic variations thus set up in the windings 12' are communicated through suitable wires 13, 14 to the magnet 15 (see Fig. 3) and cause the latter to vibrate its diaphragm 4 and emit a musical tone corresponding to that for which the form 10 was designed. The timbre forms 10 may be along one side of a straight line, as shown in Fig. 4, but I prefer to have them double as indicated in Fig. 5, the opposite edges being symmetrical with reference to each other. This places the center of attraction at the center of the magnetic pole piece 11, and consequently affects the windings 12' more uniformly. Instead of making the core 11 a sharpened plate I prefer to make it T-shaped as shown in Fig. 8, and this gives satisfactory results with less material.

The magnets 12 may normally be elevated beyond the possibility of being affected by the forms 10, each being capable of depression by a key 6 almost into touch with the corresponding form. As shown in Fig. 3 each magnet 12 is supported by an arm 16 pivoted to the bar 17 and joined by a rod 18 to a corresponding key 6. The stiff spring 19 holds the key 6 in its normal position and hence holds its magnet 12 away from its form 10. The yielding resistance of such springs gives to the performer the ability of varying the loudness of the music in proportion to the pressure applied to the keys.

By having the bar 17 spring supported and capable of depression by a pedal 20 the loudness of all the notes simultaneously sounded can be varied by a suitable actuation of such pedal, irrespective of the individual control of the notes. As shown in Fig. 3 the depression of this pedal 20 moves the magnets 12 farther from the timbre forms and thus diminishes the loudness of all the notes.

It is not necessary to furnish a separate translating device for each magnet 12, inasmuch as all or any number of the latter can be wired to a single magnet 15 and thereby superpose a large number of different vibrations upon a single diaphragm 4. The system of wiring adapted for this is the one illustrated in Fig. 4, wherein is shown means by which the instrument can be shifted at will to emit musical tones of various timbres. Upon a cylinder 22 is a plurality of timbre forms 10 for each magnet 12, any one of which can be brought beneath such magnet by adjusting the roller longitudinally. The timbre forms thus furnished to each magnet are shown as three in number with the central one of each set presented to its magnet, and while the three forms are preferably of the same pitch or frequency of repetition,

they are designed to be quite dissimilar in tone quality.

By releasing the stop 25 from its lock 26 this roller is easily shifted longitudinally to present one set of the three qualities of timbre forms to their magnets, a spring 27 acting to retain said stop in engagement with its lug.

It is evident that by having one set of timbre forms arranged to reproduce the tone of a violin; another those of a flute; another those of a piano and so on, a considerable variety in the quality of the music can be had.

Fig. 16 illustrates a modified construction in which a microphone 50 is wired in circuit with the telephone or other translating device, each microphone having a transverse arm 51 located close to a magnetic timbre form 10. To increase the energy of the magnetic pulsations transmitted, and hence the loudness of the music produced, several microphones may be provided for each timbre form, the microphones being located at identical phases of the timbre form so that their action will be cumulative. An arrangement of this sort is illustrated in Fig. 7 in which, in order that the phase relation may be made clear I illustrate a disk 52 having alternate magnetic and nonmagnetic sections 53, 54, the various inductive magnets 12 illustrated in this case being connected to a common magnet 15 in attractive relation to a diaphragm.

There are many ways in which the timbre forms may be made, such as stamping them from thin sheet metal; printing them on the cylinder with a magnetic ink; printing them with a sticky ink and then dusting the impression with iron filings or other magnetic particles; by electroplating, or by using a coating of paste impregnated with magnetic filings and various other methods, as will be obvious. The main idea is to secure a uniform layer of magnetic material whose lateral extent varies according to the variations of the sound waves to be produced.

Instead of longitudinally shifting the cylinder for the purpose of varying the quality of the timbre forms delivered to the translating device, (as described with reference to Figs. 3 and 4) each of the timbre forms 10 may be provided with a magnet of its own, switches being introduced for cutting such magnets in and out. As shown in Fig. 9 each of the timbre forms rotates beneath a fixed magnet 12 which is given a terminal 60. By moving the bar 61 to put its contact 62 into touch with any one of said terminals the magnets connected with such terminals are put into circuit with the magnet 15 of the translating device. Three timbre forms of different quality but

of equal pitch are here shown as provided for each note, but the number of forms is obviously subject to variation. In the construction above described with reference to Fig. 9 for switching at will the pulsations from any one set of magnets 12 to the translating device 15, different combinations of such pulsations cannot be transmitted to the translating device. To accomplish this I show an additional series of magnets 12 which may or may not be used in conjunction with those first described, but each of which magnets is wired to a spring finger 63 normally out of touch with a contact bar 65. Immediately below these fingers are as many stop bars 64 as there are sets of magnets and qualities of timbre forms. As I have illustrated three sets of timbre forms alike in pitch but different in tone quality for each note in the instrument, I provide three stop bars 64 and give each stop bar cam-lugs 64' spaced to contact with and elevate finger 63 three spaces apart as shown in Fig. 10.

By moving said stop bars longitudinally to elevate said fingers in accordance with a definite plan all such fingers may be put into touch with the contact bar 65 and hence into circuit with the wire 62', or any one or any two thereof may be put into such circuit. This makes it possible for the operator to deliver to the translating device any one set of timbres or qualities of music or any combination of the same.

It is evident that by having some fine singer deliver into a phonograph one or more complete octaves of musical notes, singing the broad A, for instance, and then having these phonographs reproduced into timbre forms the instrument can be adapted for the repetition of the tones of the human voice. It is only necessary to secure a phonograph of a single octave of the original notes for the reason that the other tones required are the mere variants in speed of the first.

Thus far I have mainly restricted the apparatus to musical work, but the records may not be timbre forms alone, but may be adapted to the production of any kinds of sounds. For example, a timbre form of my characteristic type involving a strip of magnetic material varying in lateral extent might be used for continuous records of songs, speeches and so on, in the manner indicated in Fig. 11. Similar disk records might be made and would have the form diagrammatically represented in Fig. 12. A cylinder record would similarly take the form shown in Fig. 13. A plurality of circular timbre forms may be concentrically arranged on a single disk as illustrated in Fig. 14. In Fig. 11 I show the timbre form as symmetrical with reference to its median

line, while in Figs. 12, 13, and 14 one boundary line is straight. While I prefer the arrangement shown in Fig. 11 the two are interchangeable for most purposes including the specific types of records shown in Figs. 11 to 14 inclusive.

Disk records such as shown in Fig. 14 may obviously be substituted for a group of disks of the type shown in Fig. 9.

What I claim as my invention and for which I desire Letters Patent is as follows, to wit:—

1. The combination of a plurality of acoustic timbre forms having smooth surfaces, each composed of magnetically attractive material of varying lateral extent; magnets having their poles within the influence of said forms; a telephonic receiver wired to said magnets; means controlling the circuits of said magnets for causing any one or more to affect said receiver; and means for producing relative travel of said forms past said magnets.

2. In an instrument for producing acoustic vibrations the combination of a rotatable member having a smooth surface of magnetic material whose lateral extent varies according to the sound vibrations to be produced; a magnet having a laterally extended pole piece presented to such surface; and a telephonic device connected with said magnet and actuated by the magnetic variations produced therein by the movement of said magnetic surface past said pole piece.

3. In a musical instrument the combination of a rotating cylinder having a superficially variable magnetically attractive surface; a wound magnet having a T-shaped pole piece presented to such surface; and a vibrating body affected by said magnet.

4. A rotating circularly arranged line of repetitions of magnetic variations; a plurality of magnets disposed to present the poles thereof at points about said line spaced to correspond with said repetitions; and a translating device actuated by all said magnets simultaneously.

5. In a musical instrument the combination of a plurality of timbre forms each comprising a rotatable member having a smooth surface of magnetic material whose lateral extent varies according to sound vibrations to be produced by the respective forms; magnets having laterally extended pole pieces, corresponding to said timbre forms; a lever mechanism for moving all said magnets simultaneously toward or from said forms; a telephonic device associated with said magnets and operable thereby; and keys, one for each magnet, for causing said magnet to operate said telephonic device when said key is actuated.

6. In a musical instrument the combination of a plurality of timbre forms each

comprising a rotatable member having a
smooth surface of magnetic material whose
lateral extent varies according to sound
5 vibrations to be produced by the respective
forms; magnets having laterally extended
pole pieces, corresponding to said timbre
forms; a lever mechanism for moving all
said magnets simultaneously toward or from
10 said forms; a telephonic device associated
with said magnets and operable thereby;

and keys, one connected to each magnet for
moving said magnets individually toward
their corresponding timbre forms.

In testimony that I claim the foregoing
invention, I have hereunto set my hand this 15
17th day of December, 1912.

MELVIN L. SEVERY.

Witnesses:

EDWARD S. CROCKETT,
A. B. UPHAM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

REPEATING ATTACHMENT FOR SOUND
REPRODUCING INSTRUMENTS,

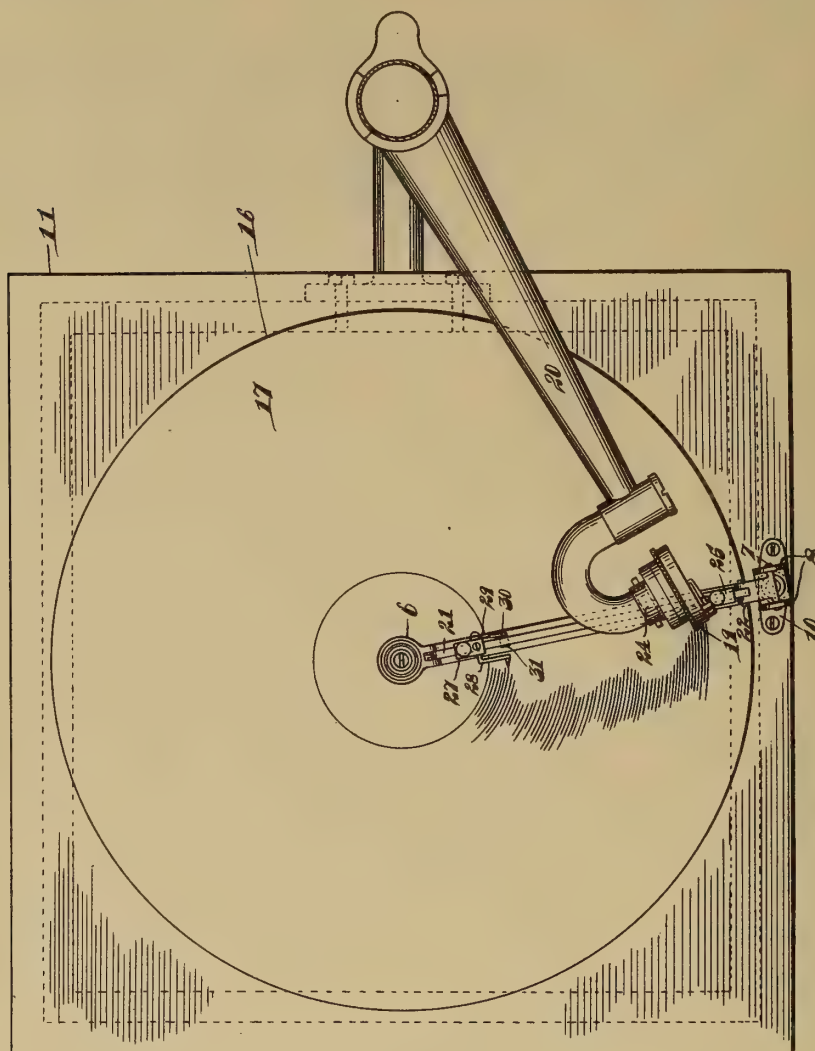
#1,218,408-----E.H. Josephson,
Patented-March 6th, 1917.
Filed-June 10th, 1916.

E. H. JOSEPHSON.
 REPEATING ATTACHMENT FOR SOUND REPRODUCING INSTRUMENTS.
 APPLICATION FILED JUNE 10, 1916.

1,218,408.

Patented Mar. 6, 1917.
 2 SHEETS—SHEET 1.

Fig. 1.



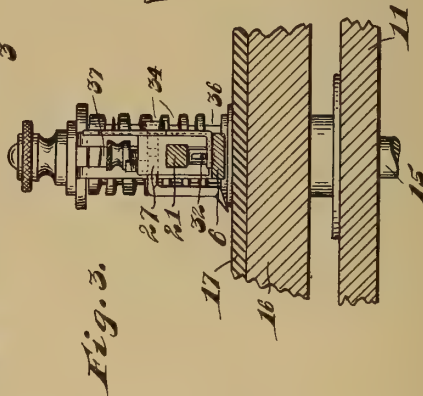
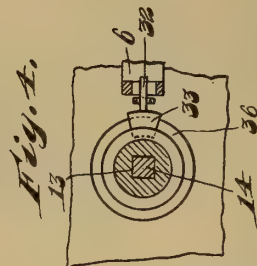
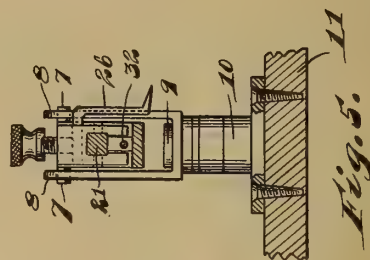
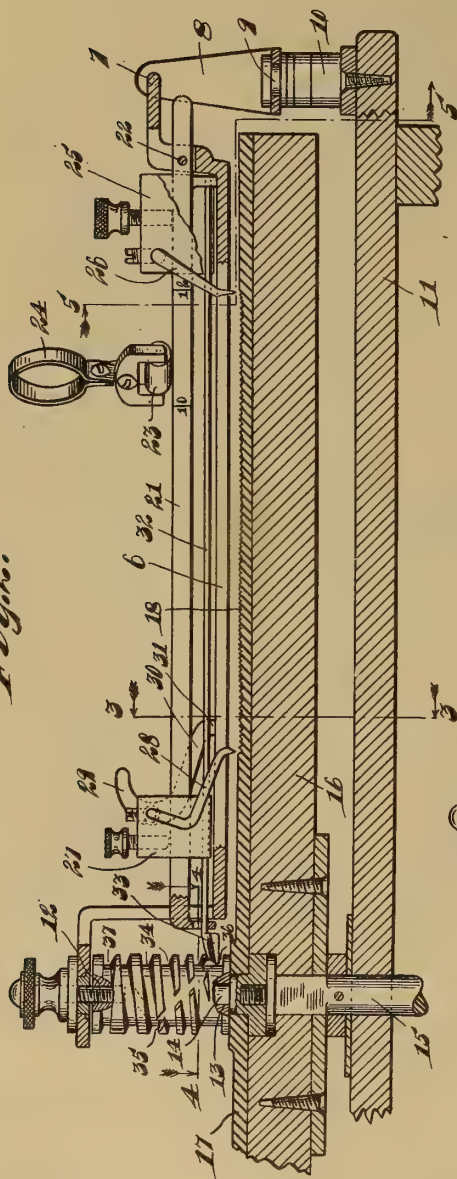
Witnesses:
 C. E. Wessels.
 B. G. Richards

Inventor:
 Eskil H. Josephson,
 By Joshua R. Harris
 his Attorney.



1,218,408.

Fig. 2.



E. E. Wessels.
B. G. Richards

*Eskil H. Josephson,
By Joshua R. Hays
his Attorney.*

UNITED STATES PATENT OFFICE.

ESKIL H. JOSEPHSON, OF CHICAGO, ILLINOIS.

REPEATING ATTACHMENT FOR SOUND-REPRODUCING INSTRUMENTS.

1,218,408.

Specification of Letters Patent.

Patented Mar. 6, 1917.

Application filed June 10, 1916. Serial No. 102,965.

To all whom it may concern:

Be it known that I, ESKIL H. JOSEPHSON, a subject of the King of Sweden, (who have declared my intention of becoming a citizen of the United States,) and a resident of the city of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Repeating Attachments for Sound-Reproducing Instruments, of which the following is a specification.

My invention relates to improvements in sound reproducing instruments, and has for its object the provision of an improved repeating attachment therefor, which is of simple construction and efficient in use.

The invention consists in the combinations and arrangements of parts hereinafter described and claimed.

The invention will be best understood by reference to the accompanying drawing forming a part of this specification, and in which,

Figure 1 is a top plan view of an instrument equipped with an attachment embodying my invention,

Fig. 2, a vertical section taken through the upper portion of said instrument,

Fig. 3, a section taken on line 3—3 of Fig. 2,

Fig. 4, a section taken on line 4—4 of Fig. 2, and

Fig. 5, a section taken on line 5—5 of Fig. 2.

The preferred form of construction, as illustrated in the drawings, comprises a suitable bracket 6 pivotally mounted at 7 in a clip 8 swiveled at 9 on the top of a post 10, secured to the base 11 of the sound reproducing instrument, the particular instrument illustrated being one employing a disk rotating on a vertical axis. A spindle 12 is rotatably mounted at the inner end of the bracket 6 and is provided, at its lower end, with a square or other non-circular socket 13 adapted to fit over the upper end 14 of the usual spindle 15 of the sound reproducing instrument, the upper end 14 being shaped to fit said socket, as indicated. The usual rotating table 16 is mounted on the spindle 15 in position to serve as a mounting for the usual record disk 17 having the usual spiral grooves and indentations 18 for reproducing sound in the usual manner, cooperating with a stylus or needle 19 on the end of the usual tone arm 20 of the instrument. A bearing bar

21 is pivotally mounted at 22 in the bracket 6 in position to traverse the disk 17 and lie under the path of travel of the tone arm 20. A roller 23 is rotatably mounted in a clip or bracket 24 secured to said tone arm in position to travel along the upper surface of the bearing member 21, as the tone arm travels inwardly on the disk 17 in the usual manner. A stop block 25 is adjustably secured to the outer end of the bearing member 21 and carries an indicating finger 23 adapted to be set in registration with the outermost groove on the disk 17 as indicated, the bearing member 21 being graduated to indicate positions for different sizes of disk 17. Another stop block 27 is adjustably secured on the inner end of the bearing member 21 and carries an indicating finger arranged to be set in registration with the innermost groove on disk 17. A bell crank 29 is pivotally mounted on stop block 27 and is provided with a depending arm 30 having a laterally extending finger 31 resting under a vertically shiftable rod 32 on bearing member 21. At its inner end rod 32 carries a swiveled dog 33 adapted to engage threads 34 and 35 on spindle 12, the threads 34 being of comparatively slight pitch but gradually increasing in pitch from the bottom upwardly on said spindle, and the threads 35 being oppositely arranged and of comparatively great pitch, the threads 34 being adapted to engage dog 33 and elevate the inner end of the bearing member 21 and the thread 35 engaging said dog and depressing the inner end of bearing member 21. An annular groove 36 is provided at the lower portion of spindle 12 and in which the dog 33 normally rests out of engagement with the threads on said spindle. Another annular groove 37 is provided at the upper end of the threads 34 and 35 cooperating therewith to direct the dog 33 from the threads 34 into the thread 35.

In operation, as tone arm 20 travels inwardly over the disk 17, the upper arm 29 of the bell crank on block 27 is engaged by said tone arm when said tone arm reaches the innermost limit of its movement, thus operating said bell crank to elevate dog 33 into position to engage threads 34 on spindle 12. The operation of threads 34 on the dog 33 is to elevate the inner end of bearing member 21 to such an inclination that the tone arm 20 will be caused to travel

downwardly thereon by the action of gravity and thus return to initial position adjacent the outer edge of disk 17. When dog 33 reaches the upper end of threads 5 34, it runs into groove 37 and thence into thread 35, being rapidly depressed and rapidly returning the bearing member 21 to normal position. This throws the stylus 19 of the tone arm 20 into engagement with 10 the grooves on the upper surface of the disk 17, causing repetition of the action of the instrument. The specific combination and arrangement of parts disclosed is simple and an efficient one for the purpose.

15 While I have illustrated and described the preferred form of construction for carrying my invention into effect, this is capable of variation and modification without departing from the spirit of the invention.

20 I, therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claims.

25 Having described my invention what I claim as new and desire to secure by Letters Patent is:

1. The combination with a sound reproducing instrument comprising a rotating spindle, a record member on said spindle and a tone arm arranged to traverse said record member, of a bearing member for said tone arm located in operative relation therewith; a block adjustable on said bearing member and bearing an indicating finger registerably with the sound producing grooves in said record member; means for tilting said bearing member to an inclination to return said tone arm to initial position; and means on said block controlling said tilting means, substantially as described.

2. The combination with a sound reproducing instrument comprising a rotating spindle, a record member on said spindle and a tone arm arranged to traverse said record member, of a bearing member for said tone arm located in operative relation therewith; a block adjustable on said bearing member and bearing an indicating finger registerably with the sound producing grooves in said record member; means for tilting said bearing member at an inclination to return said tone arm to initial position; and a bell crank lever on said block operable by said tone arm and arranged to operate said tilting means, substantially as described.

3. The combination with a sound reproducing instrument comprising a rotating spindle, a record disk on said spindle and a tone arm arranged to traverse said disk, of a bearing member for said tone arm located in operative relation with said disk; a spindle connected with said first mentioned spindle and provided with an elevating and a depressing thread; a dog on said bearing 65 member arranged to engage said threads;

and means operable by the motion of said tone arm for throwing said dog into engagement with said threads, substantially as described.

4. The combination with a sound reproducing instrument comprising a rotating spindle, a record disk on said spindle and a tone arm arranged to traverse said disk, of a bearing member for said tone arm located in operative relation with said disk; a spindle detachably connected with said first mentioned spindle and provided with an elevating and a depressing thread; a dog on said bearing member arranged to engage said threads; and means operable by the motion of said tone arm for throwing said dog into engagement with said threads, substantially as described.

5. The combination with a sound reproducing instrument comprising a rotating spindle, a record disk on said spindle and a tone arm arranged to traverse said disk, of a bearing member for said tone arm located in operative relation with said disk; a spindle connected with said first mentioned spindle and provided with an elevating and a depressing thread; a dog on said bearing member arranged to engage said threads; a bell crank on said bearing member set in the path of said tone arm; and an operative connection between said bell crank and said dog arranged to throw said dog into engagement with said threads when said tone arm reaches the inner limit of its movement, substantially as described.

6. The combination with a sound reproducing instrument comprising a rotating spindle, a record disk on said spindle and a tone arm arranged to traverse said disk, of a bearing member for said tone arm located in operative relation with said disk; a spindle detachably connected with said first mentioned spindle and provided with an elevating and depressing thread; a dog on said bearing member arranged to engage said threads; a bell crank on said bearing member set in the path of said tone arm; and an operative connection between said bell crank and said dog arranged to throw said dog into engagement with said threads when said tone arm reaches the inner limit of its movement, substantially as described.

7. The combination with a sound reproducing instrument comprising a suitable base, a rotating spindle on said base, a record disk on said spindle and a tone arm arranged to traverse said disk, of a clip swiveled to said base beyond the periphery of said disk; a bracket pivoted to said clip and arranged to traverse said disk under the path of travel of said tone arm; a spindle rotatably mounted at the inner end of said bracket and having a detachable operative connection with the spindle of the sound re-

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producing instrument; oppositely arranged
threads on said spindle, the upwardly acting
thread being of comparatively small but
gradually increasing pitch and the down-
wardly acting thread being of comparatively
steep pitch; a bearing member pivotally
mounted on said bracket under the path of
travel of said tone arm; a roller on said tone
arm traveling on said bearing member; a
dog on said bearing member arranged to be
shifted into engagement with the threads
on the spindle thereon; a bell crank on said
bearing member operatively connected with

said dog; and an operative connection be-
tween said tone arm and said bell crank
whereby said tone arm causes shifting of
said dog into engagement with said threads
when the tone arm reaches the inner limit
of its movement, substantially as described.

In testimony whereof I have signed my
name to this specification in the presence of
two subscribing witnesses.

ESKIL H. JOSEPHSON.

Witnesses:

JOSHUA R. H. POTTS.

HELEN F. LILLIS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

STOP DEVICE FOR PHONOGRAPH DISKS,
#1,218,560-----A.F.Ireton,
Patented-March 6th, 1917.
Filed-March 7th, 1916.

A. F. IRETON.
STOP DEVICE FOR PHONOGRAPH DISKS.
APPLICATION FILED MAR. 7, 1916.

1,218,560.

Patented Mar. 6, 1917.

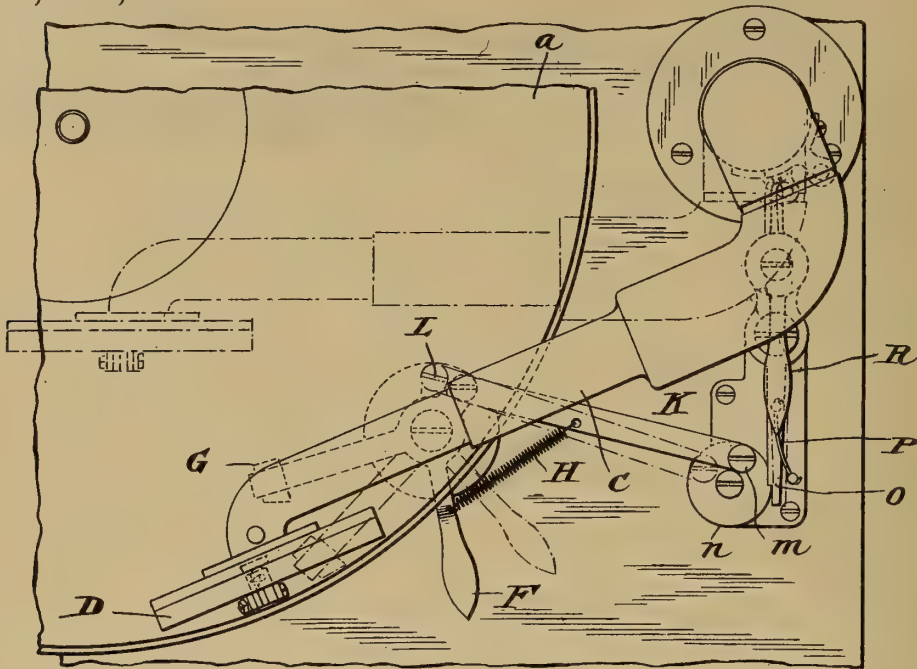


Fig. 1.

Fig. 2.

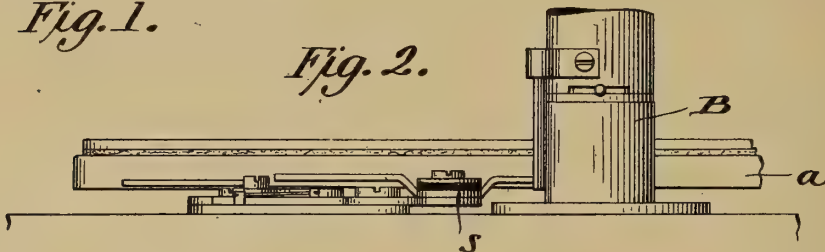
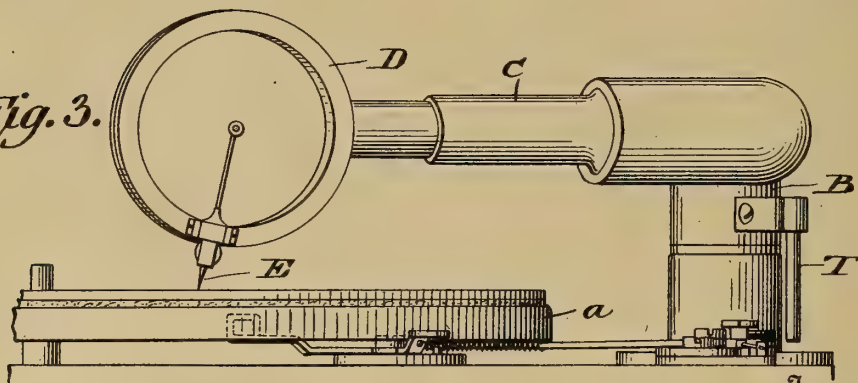


Fig. 3.



Inventor
A. F. Ireton
By his Attorney
Kerr, Page, Cooper & Hayward

UNITED STATES PATENT OFFICE.

ARTIE F. IRETON, OF RICHMOND, INDIANA, ASSIGNOR TO THE STARR PIANO COMPANY,
OF RICHMOND, INDIANA, A CORPORATION OF INDIANA.

STOP DEVICE FOR PHONOGRAPH-DISKS.

1,218,560.

Specification of Letters Patent.

Patented Mar. 6, 1917.

Application filed March 7, 1916. Serial No. 82,584.

To all whom it may concern:

Be it known that I, ARTIE F. IRETON, a citizen of the United States, residing at Richmond, in the county of Wayne and State of Indiana, have invented certain new and useful Improvements in Stop Devices for Phonograph-Disks, of which the following is a full, clear, and exact description.

This invention for which I now solicit a patent is an improvement in the means employed in connection with a phonograph, particularly of the disk type, for stopping the rotation of the disk when the stylus of the sound box has reached any desired point in its travel in the spiral groove from the outer to the central portion of the disk.

Such devices have heretofore been used to a considerable extent for stopping the disk after it has revolved a definite number of times, or when the inner end of the groove of any particular composition has been reached by the stylus, in order that the seal or the smooth portion of the disk at the center may not be traversed by the needle, and the parts otherwise exposed to undue injury or wear.

My invention resides in the form, character and mode of operation of the special means which I have devised for this purpose, and which, generally described involves a spring actuated brake adapted when tripped to bear upon the rotating disk or its table, a latch therefor, and a tripping lever in frictional engagement therewith, the end of which lies in the path of a pin or projection on the swinging portion of the tone arm, and which may be set at any desired point to be encountered by such pin and releases the brake without interfering in any other way with the movements or operation of the device as a whole.

The improvement in its preferred and specific form is illustrated in the accompanying drawings in which:

Figure 1 is a top plan view of my improved brake and so much of a phonograph as is necessary to an understanding of its nature and purpose.

Fig. 2 is a side elevation of the same.

Fig. 3 is another view in elevation of the brake, and portions of the phonograph mechanism.

I have selected in illustration of the improvement a typical form of disk phonograph

mechanism, including a rotary disk or turntable A, a tone arm comprising a vertical portion B, movable around its axis, and a horizontal portion C, carrying a sound box D, the latter provided with a stylus E which is placed in the spiral groove at the edge of the disk and which follows said groove when the device is in operation, swinging the tone arm from the position illustrated in full lines to that shown by dotted lines in Fig. 1.

Upon the frame of the box or cabinet for the instrument there is mounted on a vertical pivot pin a lever, one end constructed as a brake or braking cushion G, and the other as a handle F for turning it manually. By means of a spiral spring H, this lever is connected to a bar K, pivoted at L, at one end to the lever, and at the other to an eccentric pin M on a rotary disk N. The disk N has a tooth or notch which is adapted to be engaged by the end of a pivoted latch lever O acted upon by a light spring P, which has a normal tendency to maintain said lever in engagement with the disk, and when the handle or lever F is turned to the left, Fig. 1, the disk N is partially rotated until its notch is engaged by the latch lever O.

To the lever O at a point beyond its fulcrum is pivoted a lever R, which is in frictional contact through a washer S with said lever, and the end of this lever R extends out into the path of a pin T depending from a bracket on the vertical portion B of the tone arm, the position of which will obviously depend upon the position of the sound box and stylus with reference to the disk.

Before playing any disk, this lever R is set so that its outer or free end will be encountered by the pin T when the stylus has reached that portion of the disk where it is desired to stop the latter, and when this occurs, the latch lever will be thrown out of engagement with the disk N and the brake released, whereupon the rotation of the turntable is at once arrested.

If the lever R is not so adjusted, and the brake set, no action of this kind will take place, and the instrument may be used indefinitely without the automatic brake if so desired.

Obviously, the underlying principle of this mechanism is capable of many other

specific embodiments than that herein described, and the invention, in this regard, is not limited.

What I claim is:—

5 1. An automatic brake for stopping the rotation of a phonograph disk comprising in combination a spring actuated brake lever, a rotary notched disk, rigidly connected therewith, a latch lever for engaging said
10 disk when turned by the brake lever, a tripping lever in frictional engagement with the latch lever and a pin depending from the rotary vertical portion of the tone arm for engaging the tripping lever.

15 2. The combination with a phonograph disk or turntable, a brake lever for engagement therewith, a disk pivoted to the frame of the instrument, a connection between the brake lever and an eccentric pivotal point
20 on said disk, a spring connection between the brake lever and said connection, means for latching the disk to set the brake and means for tripping the latch when the

swinging tone arm has reached a given position.

25 3. The combination with a phonograph disk or turntable, a brake lever for engagement therewith, a disk pivoted to the frame of the instrument, a connection between the brake lever and an eccentric pivotal point on
30 said disk, a spring connected to the brake lever and said connection, a latch for engaging and holding the disk in set position, a lever in frictional engagement therewith, and a pin depending from the vertical part
35 of the swinging tone arm to engage with said lever in any position to which it may have been adjusted.

In testimony whereof I hereunto affix my signature in the presence of two subscribing witnesses.

ARTIE F. IRETON.

Witnesses:

WALTER G. CRONIN,
ARNOLD E. PFERFFER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

SOUND RECORDING AND RE-
PRODUCING MACHINE,

#1,218,625-----H.H.Brown,
Patented-March 13th, 1917.
Filed-July 12th, 1912.
Renewed-January 29th, 1917.

H. H. BROWN.
SOUND RECORDING AND REPRODUCING MACHINE.
APPLICATION FILED JULY 12, 1912. RENEWED JAN. 29, 1917.

1,218,625.

Patented Mar. 13, 1917.

3 SHEETS—SHEET 1.

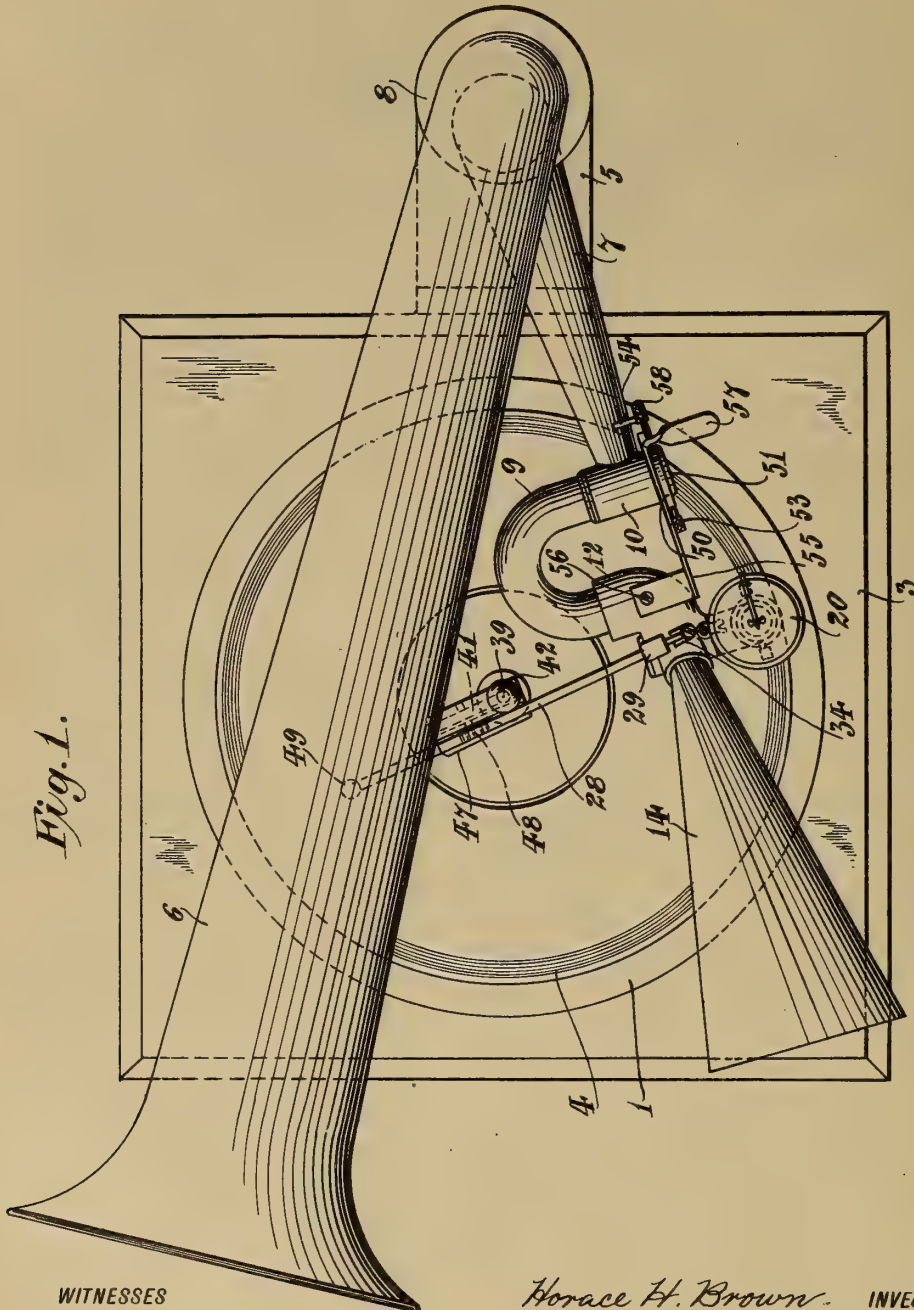


Fig. 1.

WITNESSES

Gerschwartz.
H. W. Röcher.

Horace H. Brown. INVENTOR

BY

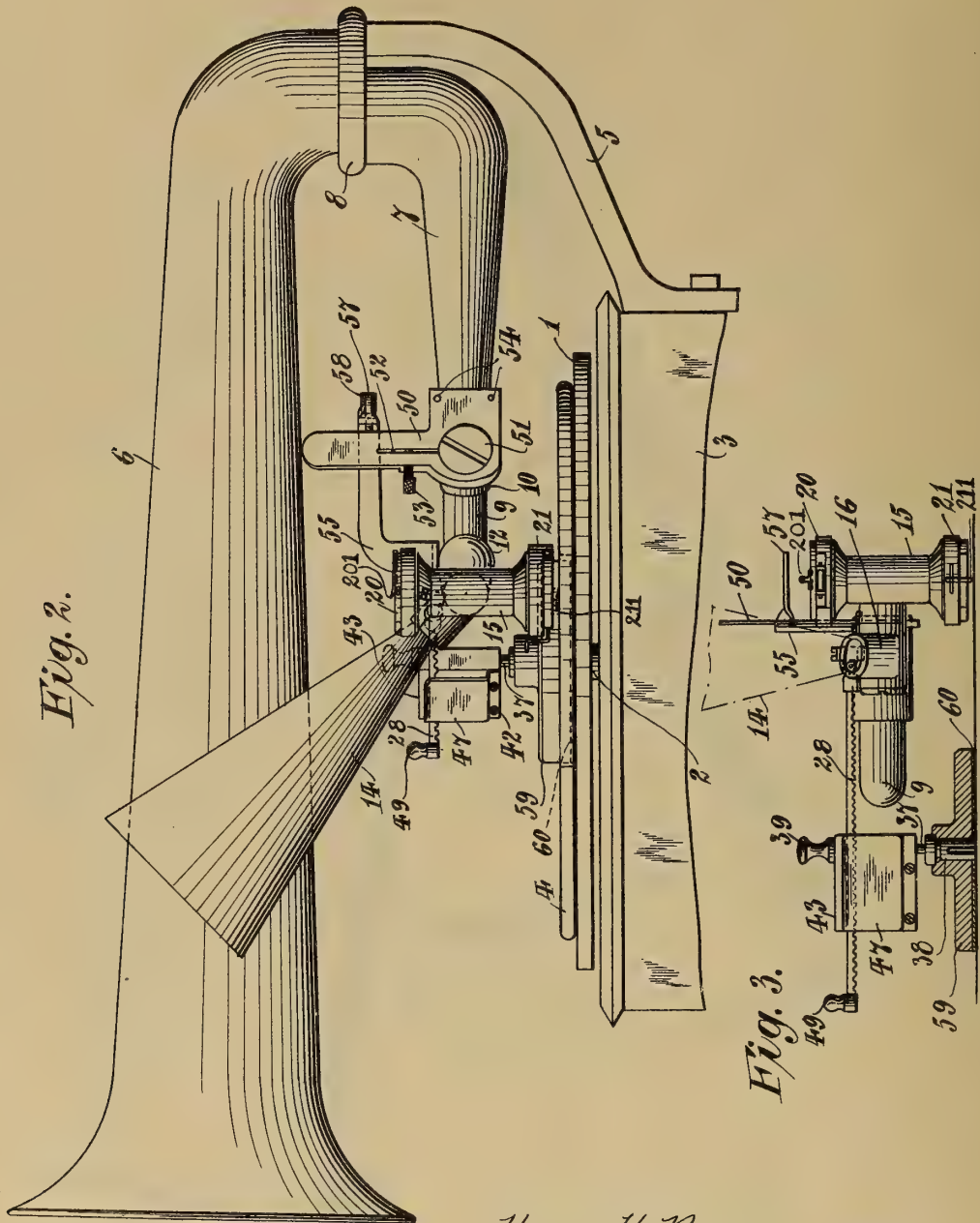
Messimer & Austin ATTORNEYS



H. H. BROWN.
 SOUND RECORDING AND REPRODUCING MACHINE.
 APPLICATION FILED JULY 12, 1912. RENEWED JAN. 29, 1917.

1,218,625.

Patented Mar. 13, 1917.
 3 SHEETS—SHEET 2.



WITNESSES
Geoffmertz.
H. Wächter

Horace H. Brown INVENTOR

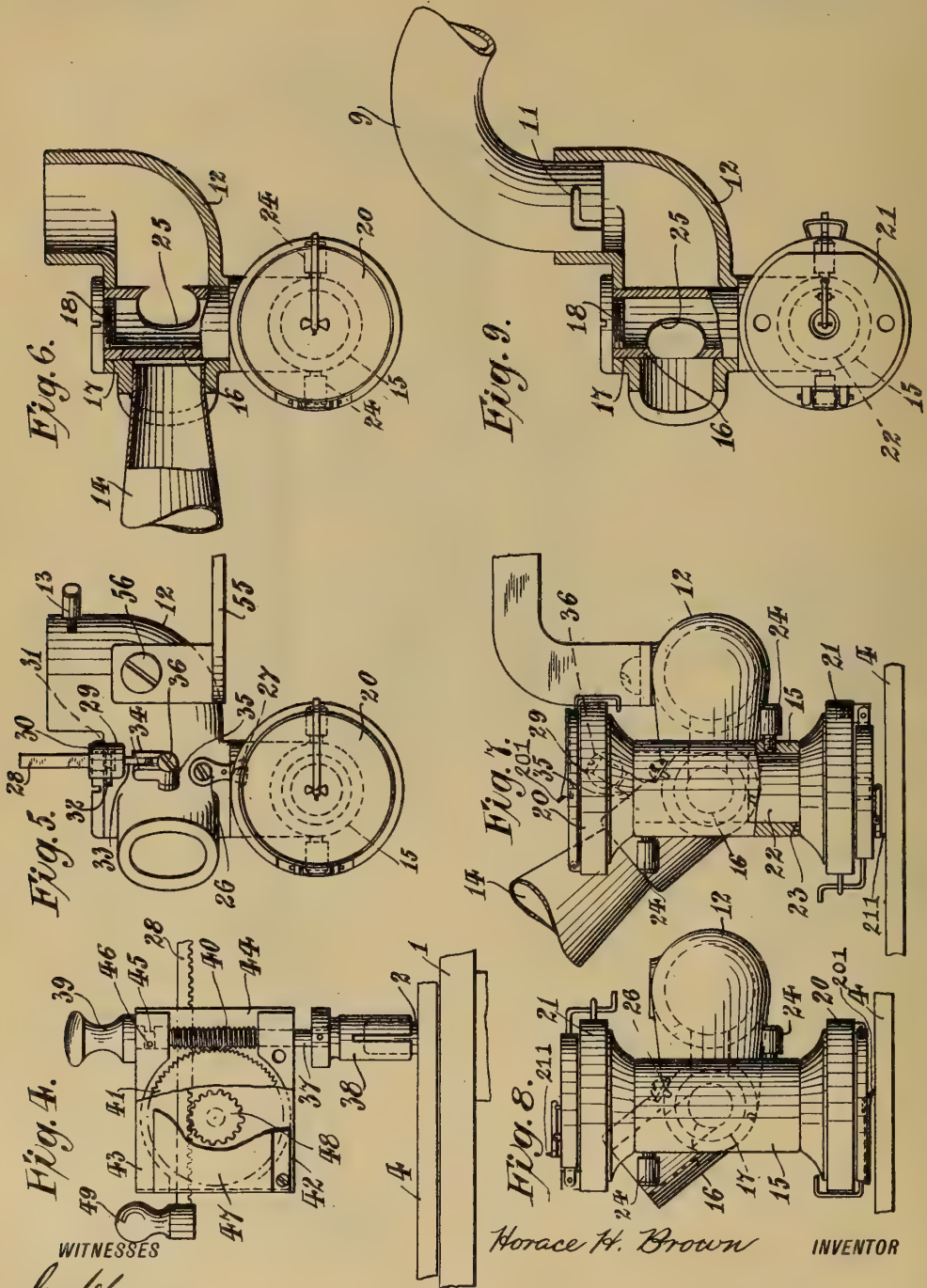
BY

Messimer & Austin ATTORNEYS

H. H. BROWN.
SOUND RECORDING AND REPRODUCING MACHINE.
APPLICATION FILED JULY 12, 1912. RENEWED JAN. 29, 1917.

1,218,625.

Patented Mar. 13, 1917.
3 SHEETS—SHEET 3.



WITNESSES
Geffman
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Horace H. Brown INVENTOR

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Messimer & Austin ATTORNEYS

UNITED STATES PATENT OFFICE.

HORACE H. BROWN, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO GOTTFRIED PIEL, OF NEW YORK, N. Y.

SOUND RECORDING AND REPRODUCING MACHINE.

1,218,625.

Specification of Letters Patent

Patented Mar. 13, 1917.

Application filed July 12, 1912, Serial No. 708,952. Renewed January 29, 1917. Serial No. 145,311.

To all whom it may concern:

Be it known that I, HORACE H. BROWN, a citizen of the United States, residing at 2950 Third avenue, in the borough of Bronx, in the city, county, and State of New York, have invented certain new and useful Improvements in Sound Recording and Reproducing Machines, of which the following is a specification.

10 This invention relates to sound recording and reproducing machines and has for its object the devising of an attachment for use with machines of the disk-record type commonly in use whereby the machine may be
15 used both for recording and reproducing records, it being necessary to first remove the sound box usually employed to permit the application of the attachment.

The various other objects of the invention will be more fully set forth in the following description of one form of mechanism embodying the invention which consists in the new and novel features of construction and combination of parts herein-
25 after set forth and claimed.

Referring to the accompanying drawings:—

30 Figure 1 is a plan view of a phonograph with the attachment applied and set for reproducing.

Fig. 2 is a side elevation of the complete machine showing the styli positioned as in Fig. 1, and the box of the machine broken away.

35 Fig. 3 is a side elevational view of the attachment, showing a friction drive in sectional view, and showing other parts broken away.

40 Fig. 4 is a side view of the mechanism for moving the styli toward the center of the record-disk, parts being shown broken away.

45 Fig. 5 is a plan view of the sound box and coupling elbow with parts broken away, and the recorder stylus turned to inoperative position.

Fig. 6 is a plan view similar to Fig. 5 shown partly in section.

50 Fig. 7 is a side elevation partly in section and partly broken away of the parts shown in Fig. 6, with the reproducing stylus in contact with the record-disk.

Fig. 8 is a side elevation similar to Fig. 7

showing the recording stylus in contact with the record-disk, and

Fig. 9 is a plan view, partly in section, of 55 the parts in the positions shown in Fig. 8.

The machine shown in the drawings is a well known type and comprises a revolving table 1 mounted on a vertical shaft 2 projecting from the top of a case 3, within 60 which is the mechanism for revolving the shaft (not shown). A record disk 4 is supported by the revoluble table and is centrally perforated for passing it over the end of the shaft 2 which is permitted to extend 65 upwardly from the table and for a suitable distance beyond the record. A bracket 5 projects from the side of the case 3 for supporting thereon a horn 6, through which the sound passes from the reproducing stylus 70 when the machine is used as a reproducer. A tube 7 is in communication with the horn 6 and is supported by the bracket 5 through means of a swivel joint connection 8. This permits the tube to have a swinging move- 75 ment in a horizontal plane about its swivelled end.

A U shaped tube or crook neck 9 is connected to the other end of the tube 7 by means of the swivel connection 10, thereby 80 permitting the tube 9 to have a swinging movement at its outer end in a vertical plane. This end has a bayonet joint slot 11, which in the ordinary use of the machine serves to secure the reproducing sound box 85 in detachable engagement, and which in the present instance affords means for securing the attachment to the tube 9.

The double swivel connections of the tubes 7 and 9 afford the required free movement 90 of the styli necessary on account of the irregularities in the revolving motion of the record-disk. The joint 8 also allows the styli to move to and from the center of the record-disk. 95

The attachment comprises an L shaped tubular support 12. This is connected to the free end of the U shaped tube 9 and has a pin 13 for forming a bayonet joint with the slot 11 in the ordinary manner. The 100 outer end of the support is suitably inclined upward to engage a sound receiving horn 14.

A tubular stylus retainer or sound box 15 is provided with a tubular branch 16 extend-

ing from the side thereof midway of its ends, for engaging it within a transverse horizontal bore 17 formed in the support 12, to permit the sound box 15 to rotate. The free end of the tube 16 is threaded internally to receive the large headed cap screw 18, which serves to hold the sound box in place.

Within the two ends of the sound box 15 are disposed the heads 20 and 21 carrying the styli 201 and 211 for producing and reproducing the records respectively. They are of ordinary and well known construction and further description is not deemed necessary here. They terminate in stems 22 for engaging them with their respective ends of the sound box 15, and are suitably positioned and secured therein by means of the pins 23 and set screws 24. The tube 16 is provided with an orifice 25 which affords communication between the heads 20 and 21 carrying the styli 201 and 211 and the receiving horn 14 and transmitting horn 6 respectively, accordingly as the sound box is rotated to bring the recording stylus 201, or the reproducing stylus 211 down upon the record-disk 4. The sound box is yieldingly held in either of its positions by means of a spring clip 26 suitably secured at one of its ends to the L shaped support 12 and having a projection 27 in its other end which snaps in similar depressions formed in the sound box support, when the latter is brought to one or the other of its vertical positions.

A rack bar 28 is secured to the support 12 by means of the joint 29. This comprises a socket 30 in which the rounded end of the rack bar 28 is rotatably secured by means of the groove 31 formed therein and the screw 32 passed through the socket and engaging the groove. The socket is provided with a rearwardly extending lug 33, which is pivotally connected to the pair of lugs 34 projecting from the hub 35, pivotally secured by screw 36 to the support 12. This forms in effect a universal joint and permits the recording stylus to have the freedom of movement relative to the rack bar, which is necessary while the record is being made.

A vertical shaft 37 is detachably coupled with the shaft 2 by means of the resilient sleeve 38. The sleeve is secured to the shaft 37, and is longitudinally slit to embrace the shaft 2 with sufficient force to couple the two shafts in driving engagement. A handle 39 terminates the shaft 37 and aids in connecting it with the shaft 2. The shaft 37 is provided with a worm 40 which engages with the worm gear 41 mounted within a casing 42 between the plates 43 and 44. The upper and lower walls of the casing are bored to receive the shaft 37 and the casing is retained in suitable rotatable position thereon by means of the groove 45 formed in

the shaft and the pin 46 projecting through the casing into the groove.

A plate 47 is suitably secured to the casing 42 along its lower edge, thereby leaving a space between it and the plate 43. Within this space and secured upon the shaft with the worm gear 41 is a pinion 48, for engaging the rack bar 28. The space between the plates 43 and 47 is opened at both sides and top and the rack bar is let fall within the space from the top to extend at either end, so that it may be easily engaged with or disengaged from the pinion 48. A handle 49, also serving as a weight, is secured to the end of the rack bar for raising and lowering it, and for holding it upon the pinion 48 and brought in engagement therewith.

The swivel joint 10 permits excessive weight to be supported by the operating stylus, and to correct this, a plate 50 is secured to the end of the tube 7, preferably by providing it with a perforation for embracing the end of the swivel 10. A slit 52 is made in the plate opening into the perforation, and a screw 53 is screwed into the plate across the slit for drawing it together to form a tight hold of the plate with the swivel 10. The plate is also provided with pins 54, which project therethrough and extend on either side of the tube 7 at a suitable distance from the swivel 10 to hold the plate from being moved when supporting its load. An arm 55 is suitably formed for securing it to the L shaped support 12 as by the screw 56 and for passing it behind the plate 50, where it terminates in a handle 57. An adjusting screw 58 passes through the arm 55 at the rear of the plate 50 and has its end directed to abut against the plate, thereby relieving the stylus of its load to a greater or less extent depending upon the adjustment of the screw.

Figs. 2 and 3 show another way of perfecting a drive of the shaft 27. The sleeve 38 in this case tightly fits within a heavy disk 59, which sets in central position upon the table 1 in frictional contact therewith. To increase the friction a disk of felt 60 or other suitable material may be interposed between the table and disk. In this construction the record disk has a central perforation large enough to permit it to pass over the disk 59, and all that is necessary when placing a disk upon the table or removing one therefrom is to remove the rack bar 28 from its gear 48.

The operation of the machine is as follows:—When it is desired to make a record, the sleeve 38 is withdrawn from the shaft 2 with the aid of the handle 39, and a blank disk 4 is placed upon table 1, the shaft 2 extending through an opening in the disk. The sleeve 38 is then replaced upon the shaft 2. When the weighted disk 59 is employed, the sleeve 38 need not be removed. In this

instance it is only necessary to raise the rack bar 28 from the casing 42 and to place the blank disk 4 over the weighted disk 59. The stylus support 15 is then turned to bring the recording stylus 201 upon the blank disk 4 at a suitable point near the circumference where the record is to begin. When the sound box is turned to this position it is brought into communication with the receiving horn 14 through the orifice 25. With the stylus in this position the rack bar 28 is lowered within the casing and into engagement with its gear wheel 48.

The adjusting screw 58 is then set to take the excessive weight off the stylus, so that it will cut the desired spiral groove in the record. The machine is then ready to be operated in the usual way. The relative speed of the disk 4 and rack bar 28 is dependent upon the relative sizes of the worm 40, gear 41 and gear 48. The relative sizes of these gears are such as to move the rack bar 28 and thereby the stylus 201 toward the center with the required velocity to cut a spiral groove upon the disk having the desired pitch. The stylus moves toward the center of the blank disk in the arc of a circle and the rack bar 28 is accordingly secured in link fashion to the sound box support 12 and shaft 37 to allow for this movement and at the same time to permit the driving mechanism to properly operate.

After the record has been produced upon the disk it may be reproduced by turning the stylus support 15 to bring the reproducing stylus 211 upon the record, which turning, at the same time turns the orifice 25 thereby affording communication between the stylus 211 and the horn 6. The stylus is now placed in the groove formed upon the record at the beginning thereof, that is to say at the circumference of the disk, and the machine operated as before.

Although I have shown only one form of mechanism embodying my invention, it is obvious that various changes within the skill of the mechanic may be made therein without departing from the spirit of the invention, provided the means set forth in the following claims are employed.

Having thus described my invention, I claim:—

1. In a sound recording and reproducing machine of the disk record type, a tubular support, a sound receiving horn secured to one end of the support, a sound transmitting horn secured to the other end of the support, a sound box rotatably mounted in the support, a recording stylus secured in one end of the sound box, a reproducing stylus secured in the other end of the sound box, said sound box having an orifice adapted to afford communication between the interior of the sound box and the horns when the styli are turned to contact with the disk record, and

means for moving the sound box across the disk.

2. In a recording machine of the disk record type, a sound box supporting swinging arm, a longitudinally movable member for swinging the arm across the disk, operating means for the member, a universal joint connecting the member with the arm, and a rotatable joint connecting the member with the operating means to permit relative movement of the swinging arm and longitudinally movable member.

3. In a graphophone a tubular support having a pair of outlets, one adapted to lead to a reproducing horn and the other adapted to lead to a recording horn, and a sound box rotatably mounted in said support and adapted to bring opposite ends thereof into operative engagement with a disk, said box having an orifice positioned within the bore of said support adapted to control the communication between the engaged end of said box and one of said outlets.

4. In a disk graphophone the combination with a pair of horns, of a unitary member carrying a recording and a reproducing device immovable relatively to each other, said unitary member being rotatably mounted intermediate its length for bringing either device into engagement with a record disk and having means controlling a selective communication with said horns.

5. In a disk graphophone, a tube having a movement in a plane parallel to the disk, a U tube swiveled to one end of said first mentioned tube and having a leg thereof free to move in a plane perpendicular to the plane of the disk, a support detachably connected to said movable leg and a sound box having oppositely disposed styli revolvably mounted in said support whereby either stylus may be brought into operative relation to the disk.

6. In a graphophone, a hollow tubular spool shaped sound box mounted intermediate its length for rotation, heads extending parallel to each other removably positioned in opposite ends thereof and constituting the enlarged ends of the spool shaped sound box, styli carried by said heads, said sound box having an outlet in the side thereof directly open to both of said heads, and a tube communicating with said outlet and constituting an extension from the side of the sound box.

7. In a graphophone, a sound box having styli at opposite ends thereof, a tubular member communicating with said box intermediate the ends thereof, said member having a plurality of horn outlets therefrom and means forming a part of said box controlling said horn outlets.

8. In a graphophone, a disk support, an actuating shaft for said support having a portion projecting above the same, said

shaft including a worm portion dismountable from said projecting portion of the shaft to permit the positioning of a disk on said support, a sound box movable across
5 said support and a rack and pinion connection between said box and worm portion.

9. In a graphophone, an actuating shaft, a gear transmission housing removably mounted on said shaft, a sound box and a
10 rack attached to said box and adapted to be swung into engagement with the transmission in said housing.

10. In a disk graphophone, a support adapted to carry a record disk, an actuating
15 shaft therefor, a sound box and means for drawing said box across the disk, said means including a rack connected to said box, a shaft removably connected to said actuating shaft and means connecting said last

named shaft with said rack and removable
20 therewith.

11. In a graphophone, a turntable, a member held by its weight in frictional contact with said turntable to revolve with
the same, said member adapted to have a
25 record disk inserted over the same to rest on said turntable, a sound box movable relative to said disk and means connected to said member to actuate the sound box, said
means being readily removed from the mem-
30 ber to permit the positioning of the record disk.

This specification signed and witnessed
this 8th day of July, A. D., 1912.

HORACE H. BROWN.

Signed in the presence of—

S. C. YEATON,

F. E. MANUEL.

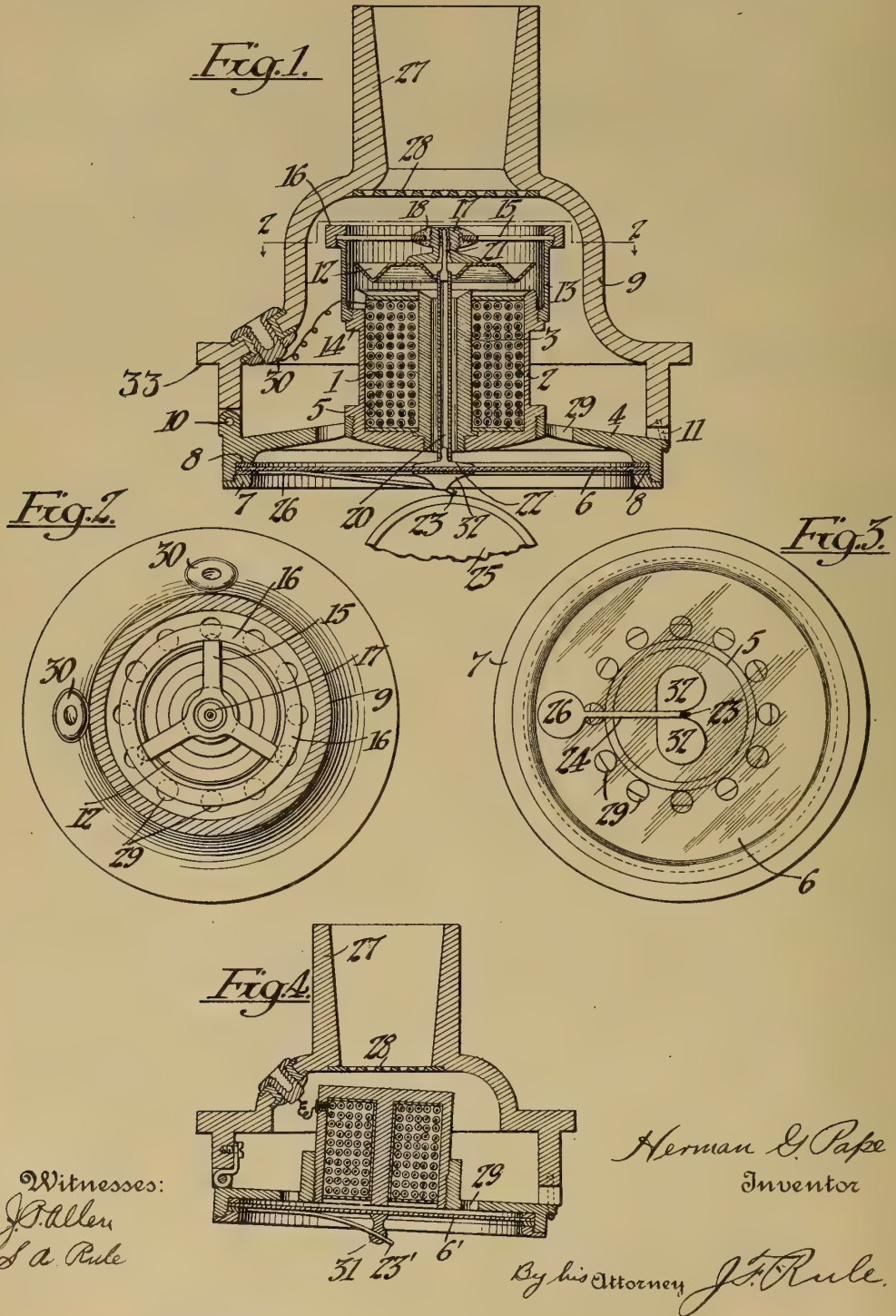
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

PHONOGRAPH RECORDER AND REPRODUCER,
#1,218,799-----H.G.Pape,
Patented-March 13th, 1917.
Filed-March 8th, 1915.

H. G. PAPE.
 PHONOGRAPH RECORDER AND REPRODUCER.
 APPLICATION FILED MAR. 8, 1915.

1,218,799.

Patented Mar. 13, 1917.



Witnesses:
J. B. Allen
S. A. Rule

Herman G. Pape
 Inventor

By his Attorney *J. T. Rule.*

UNITED STATES PATENT OFFICE.

HERMAN G. PAPE, OF NEW YORK, N. Y.

PHONOGRAPH RECORDER AND REPRODUCER.

1,218,799.

Specification of Letters Patent.

Patented Mar. 13, 1917.

Application filed March 8, 1915. Serial No. 12,770.

To all whom it may concern:

Be it known that I, HERMAN G. PAPE, a citizen of the United States, and resident of New York, in the county of New York and State of New York, have invented a certain new and useful Phonograph Recorder and Reproducer, of which the following is a specification.

My invention relates to an instrument adapted for making phonograph records of sounds mechanically, electrically or telephonically transmitted to the instrument, which instrument is also adapted for use as a reproducer.

An object of the invention is to provide a practical means for making records on phonograph recording blanks as cylinders, disks, or the like, of mechanically or telephonically transmitted sounds such as musical productions, speeches, or other subject matter which it may be desired to record for phonographic reproductions.

A further object of the invention is to provide an instrument which is adapted both for making records of telephonically transmitted sounds and also of sounds conveyed directly thereto independently of the telephone circuit and for reproducing the same independently of the telephone circuit.

The instrument may comprise an electro-magnet for connection in a telephone circuit, an armature for the magnet arranged to vibrate in response to electrical impulses in the electro-magnet, a diaphragm connected to vibrate with the armature, and a stylus or style comprising a sapphire or diamond point mounted on the diaphragm. In making a record the style may bear on a suitable tablet or recording blank, as for example, a revolving wax cylinder and support the weight of the electro-magnet. The vibrations of the style with the diaphragm operate in a well known manner to produce in the impression material of the cylinder a record capable of reproduction in a phonograph. The electro-magnet may be mounted within a casing provided with means through which sounds may be conveyed directly to the diaphragm and vibrate the latter for making records independently of the telephone circuit.

Other features of the invention will appear hereinafter.

In the accompanying drawings, Figure 1 is a sectional elevation view of an instrument embodying the principles of my invention.

Fig. 2 is a sectional plan view as indicated by the section line 2—2 on Fig. 1. Fig. 3 is a bottom plan view. Fig. 4 is a sectional elevation view of a modification.

The electro-magnet may comprise a winding 1 within a shell 2 of magnetic material, and a tubular core 3 having a screw threaded connection with the base of the shell 2. The electro-magnet is mounted on a support 4 in the form of a plate or disk with a central screw threaded opening to receive the correspondingly threaded end of the shell 2, the latter being provided with a flange 5 which abuts against the disk 4.

A diaphragm 6, which is preferably made of glass but may be made of other suitable material, is mounted on the supporting plate 4, being held thereon by a threaded ring 7 which forms with said plate an annular recess to receive the periphery of the diaphragm. Washers or gaskets 8 of paper or other compressible material are placed in said annular recess on opposite sides of the diaphragm. The plate 4 forms a cap or end piece for a casing 9 containing the electro-magnet, said plate being connected to the casing by a hinge 10, and supported at a point opposite the hinge by a latch or bail 11. The latch 11 permits a limited up and down movement of the support 4 and parts carried thereby for a purpose that will appear hereinafter. The casing may be shaped, as shown, for example in Fig. 4, so that when the latch is released the support 4 can be swung down to carry the electro-magnet out of the casing.

An armature 12 is yieldingly supported above the electro-magnet for vibration in response to electrical impulses in the magnet coil. The means for supporting the armature comprises a hollow cylinder or ring 13 having a screw threaded connection with the magnet shell 2, a flange 14 on said shell forming a shoulder against which the lower end of the cylinder abuts. A flexible spider comprising thin elastic radial arms 15, is clamped between the upper end of the cylinder 13 and a ring 16 threaded on the cylinder. A stem 17 fixed to the armature, projects upwardly through a central opening in the spider but out of direct contact therewith, and is connected to the spider by cement 18.

A connection between the stem 17 and the diaphragm 6 comprises a hollow rod or tube 20 extending through the core 3 of the elec-

tro-magnet. The upper end of said tube may extend through an opening in the armature 12 and is provided with a roughened stem or connecting piece 21 which projects into the hollow stem 17 and is secured thereto by the cement 18. The lower end of the stem 20 has fixed thereto a foot 22 which is cemented to the diaphragm 6.

With the above construction, the armature may vibrate freely in response to magnetic impulses set up therein by the electrical impulses transmitted through the electro-magnet. These vibrations are imparted to the diaphragm, the latter being capable of producing sound waves corresponding to those electrically transmitted through the electro-magnet. The elastic spider while permitting the armature to vibrate, has a constant tendency to return the armature to its normal position of rest and to thereby bring the diaphragm also to its normal position.

To enable the instrument to be used as a phonautograph for registering the vibrations set up in the diaphragm, a style 23 having a point of hard material as a sapphire or diamond point, is attached to the diaphragm as by means of a holder 24 which may be made of a sheet of aluminum formed into a tube in the end of which the style 23 is secured, said holder having flat portions or wings 32 cemented to the diaphragm, the end of said holder opposite the style having a flat portion 26 also cemented to the diaphragm.

In operation, the style 23 may rest on a blank suitable for recording, as for example a revolving cylinder 25 which is to receive the record, and the weight of the support 4 and the electro-magnet and other parts mounted thereon is carried by the said style which is thus caused to bear with a yielding pressure against the blank 25. The vibrations set up in the electro-magnet cause the style 23 to vibrate and thereby produce in the impression receiving material of the blank 25, tracings or impressions having characteristics corresponding to the sounds producing the vibrations. In this manner phonautograph records are produced of the telephonically transmitted sounds. It will be seen that the instrument may be properly termed a telephonautograph.

The casing 9 forms a carrier for the electro-magnet and its support 4, and is designed to be mounted on the usual swinging arm or carrier to swing toward and from the cylinder, and which arm is caused to travel lengthwise of the cylinder as the latter rotates, in a manner well understood by those familiar with the art. The casing is provided with a flange 33 by which it is supported on said swinging arm.

The instrument is further adapted for making records of sounds transmitted there-

to independently of the electro-magnet and its circuit. For this purpose the casing 9 is formed with a tube or a funnel 27 to receive the sounds to be recorded and for transmitting or carrying the reproduced sounds. The sounds entering said tube are transmitted through a perforated diaphragm 28, and pass through the casing around the electro-magnet and through an annular series of openings 29 and impinge on the diaphragm. The diaphragm is thus vibrated and the sounds recorded by the vibrating style. It will be seen that the instrument is also adapted to serve as a reproducer, and as an ordinary telephone receiver. The terminals of the magnet coil may be attached to electrical terminal sockets 30 mounted in the casing to receive spring-clip terminals of the telephone circuit wires.

Sound waves produced by vibrations of the diaphragm 6 may be transmitted through the openings 29, thence through the openings in the grid 28 and out of the funnel 27, to which may be connected any other well known or desired sound conveyer, for the accomplishment of the purpose set forth.

Fig. 4 illustrates a modification in which the diaphragm 6' is made of magnetic material and is vibrated directly by the electro-magnet. In other words the diaphragm itself forms the vibrating armature. The style 23' may be in the form of a rod supported adjacent its point by a block 31 secured to the armature.

Modifications other than those herein disclosed may be resorted to without departing from the spirit and scope of my invention and portions of the invention may be used without others.

What I claim is:—

1. In an instrument for making phonograph records, the combination of an electro-magnet, a diaphragm, means for causing the diaphragm to vibrate in response to electrical impulses in the electro-magnet, an inclosing casing for the electro-magnet, a cover piece hinged to the casing, said electro-magnet and diaphragm mounted on said cover piece, to move up and down therewith relatively to the casing, and a stylus connected to the diaphragm to vibrate therewith.

2. In a sound recording instrument, the combination with an electro-magnet, of a diaphragm, means for causing the diaphragm to vibrate in response to electrical impulses in the electro-magnet, a plate providing a peripheral support for the diaphragm, and on which the electro-magnet is mounted, an inclosing casing for the electro-magnet, said supporting plate being hinged to the casing, and a stylus connected to the diaphragm to vibrate therewith.

3. In a sound recording instrument, the combination of an electro-magnet, a dia-

phragm, means for causing the diaphragm to vibrate in response to electrical impulses in the electro-magnet, a plate providing a peripheral support for the diaphragm, and on which the electro-magnet is mounted, an inclosing casing for the electro-magnet, said supporting plate being hinged to the casing, a stylus connected to the diaphragm to vibrate therewith, said casing having an opening to provide a passage for the transmission of sound waves through the casing to the diaphragm, whereby the latter may be vibrated by the direct action thereon of sound waves transmitted thereto independently of the electro-magnet.

4. In a sound recording instrument, the combination with an electro-magnet, of a diaphragm, means for causing the diaphragm to vibrate in response to electrical impulses in the electro-magnet, a plate providing a peripheral support for the diaphragm, and on which the electro-magnet is mounted, an inclosing casing for the electro-magnet, said supporting plate being hinged to the casing, a stylus connected to the diaphragm to vibrate therewith, said casing having an opening to provide a passage for the transmission of sound waves through the casing to the diaphragm, whereby the diaphragm may be vibrated by the direct action thereon of the sound waves transmitted thereto independently of the electro-magnet, said diaphragm being located on the lower or outer side of said end plate, the latter having open portions for the passage of said sound waves.

5. In a sound recording instrument, the combination with an electro-magnet, and an armature therefor, of a support on which the electro-magnet is mounted, a diaphragm mounted on said support, means forming an elastic mounting for the armature permitting it to vibrate freely in response to electrical impulses in the electro-magnet, a stem connecting the diaphragm and said armature, cement connecting the armature to said elastic means and permitting the diaphragm to be connected through said stem to said elastic support without stress or strain on the diaphragm when in its normal position of rest, and a stylus connected to vibrate with the diaphragm.

6. In a sound reproducing instrument, the combination of an electro-magnet having a vertically disposed hollow core, a support on which said magnet is mounted, a horizontally disposed diaphragm mounted on said support beneath the electro-magnet, an armature above the electro-magnet, a spider located above the electro-magnet and comprising elastic radial arms, said spider supported on the electro-magnet, means for connecting the armature to the spider, a stem extending through said hollow magnet core and providing a connection between the dia-

phragm and the said armature, and sound recording means actuated by the diaphragm.

7. In a sound reproducing instrument, the combination with an electro-magnet, means for supporting a diaphragm beneath the electro-magnet, the electro-magnet having a hollow core, an annular support mounted on the electro-magnet and extending upwardly therefrom, a spider comprising elastic radial arms attached at their outer ends to said support, an armature located above the electro-magnet, a stem extending through said hollow core and attached at its lower end to the diaphragm, and means connecting the armature and the upper end of said stem to the spider at its center, whereby the armature is suspended from the spider to vibrate in response to electrical impulses set up in the electromagnet, and said vibrations are transmitted to said diaphragm, and a stylus connected to the diaphragm for recording the vibrations.

8. The combination of an electro-magnet having a vertical hollow core, an armature above said electro-magnet, a diaphragm below the electro-magnet, a rod extending through said core and connecting the armature and diaphragm, a stylus connected to the diaphragm, means for elastically supporting the armature and said rod at a point above the electro-magnet, a casing inclosing the electro-magnet, and an end plate or closure for the lower end of the casing and hinged to the casing, the magnet and diaphragm both being mounted on said end plate.

9. In an instrument for making phonographic records, the combination of an electro-magnet, a diaphragm arranged to be vibrated thereby, a support on which said electro-magnet and diaphragm are mounted, means actuated by the diaphragm to record the vibrations on a rotating cylinder, and a carrier on which said support is mounted to move freely relatively to the carrier toward and from the cylinder and permitting the weight of the electro-magnet and support to be carried on the cylinder while said carrier moves lengthwise of the cylinder.

10. In a phonographic instrument, the combination of an electro-magnet, means actuated thereby for producing on a recording blank, a record corresponding to electrical impulses in the electro-magnet, a support on which the electro-magnet is mounted, a carrier to which said support is hinged to permit the electro-magnet to swing toward and from said recording blank, said support and its carrier adapted to traverse the recording blank.

11. In a phonographic instrument, the combination of an electro-magnet, means vibrated thereby for making a record on a recording blank, a support on which said electro-magnet and said means are mounted,

and a carrier to which said support is hinged
to swing with said electro-magnet and said
means toward and from the recording blank,
said carrier and support being adapted to
5 travel as a unit to traverse the recording
blank.

Signed at New York in the county of New

York and State of New York this 2nd day
of March, A. D. 1915.

HERMAN G. PAPE.

Witnesses:

IDA B. PAPE,

IDA D. PAPE.

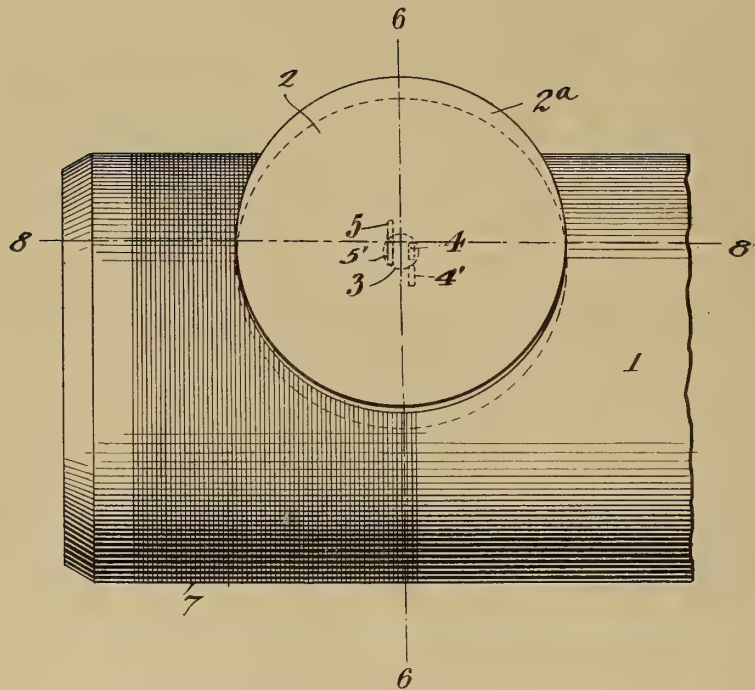
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

RECORDER REPRODUCER DEVICE,
#1,218,918-----C.E.Woods,
Patented-March 13th, 1917.
Filed-March 18th, 1915.

C. E. WOODS.
RECORDER REPRODUCER DEVICE.
APPLICATION FILED MAR. 18, 1915.

1,218,918.

Patented Mar. 13, 1917.



Witnesses:
R. C. Fitzhugh

Inventor
Clinton E. Woods.
By his Attorneys
Mawro, Cameron, Lewis & Massie.

UNITED STATES PATENT OFFICE.

CLINTON E. WOODS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

RECORDER-REPRODUCER DEVICE.

1,218,918.

Specification of Letters Patent.

Patented Mar. 13, 1917.

Application filed March 18, 1915. Serial No. 15,206.

To all whom it may concern:

Be it known that I, CLINTON E. WOODS, a citizen of the United States, and a resident of Bridgeport, Fairfield county, Connecticut, (whose post-office address is care of American Graphophone Co., Bridgeport, Connecticut,) have invented a new and useful Improvement in Recorder-Reproducer Devices, which invention is fully set forth in the following specification.

This invention relates to talking-machines employed interchangeably for recording and reproducing, and commonly known as "dictation-machines." A well-known form of such dictation-machines is shown in the Macdonald U. S. Patent No. 1,100,024, dated June 16, 1914, in which the recorder-reproducer "head" is mounted on a suitable carriage that travels along the cylinder, and has a single diaphragm equipped with both a recording-stylus and a reproducing-stylus disposed in alinement in the vertical plane at right angles to the axis of the rotating cylinder; and by shifting said recorder-reproducer backward or forward in said plane, either stylus is thrown out of engagement while the other is brought into operative position, or the head is put into neutral position with both styli out of engagement.

In dictating to such machines, it is frequently desirable to interrupt the dictation and listen to the words just recorded. This may be done, after first putting the recorder-reproducer into its neutral position, by sliding the carriage backward (along the cylinder) the desired distance, and then bringing the reproducing-stylus into position. However, it is quite a delicate and difficult operation to slide the head backward just the right distance; and therefore so-called "back-spacers" have been devised, by which the head is moved in reverse direction one step at a time. Again, upon resuming the dictation, after listening to the reproduction, the operator is liable to bring the recording-stylus into contact with an already-recorded portion of the cylinder, thus destroying the record already made; or, in making sure to avoid this, the carriage is liable to be advanced too far, with an unnecessary sacrifice of recording-space. To avoid these troubles, so-called "forward-spacing" devices have been designed. The object of the present invention is to attain the same results of back-spacing

and forward-spacing, without having to complicate the machine with special mechanisms for that purpose.

The present invention consists in locating the two styli out of the alinement referred to,—that is, in placing the recording-stylus somewhat in advance of the reproducing-stylus, so that by merely shifting from the recording-position to the reproducing-position—and without sliding the carriage—the reproducing-stylus is at once brought into engagement several record-grooves behind where the recorder has just been operating; and then the operator can readily listen to what he has just been dictating; and, when such reproduction is finished, the mere bringing of the recording-stylus into position insures that it shall engage the cylinder far enough in advance not to destroy any portion of the record already made.

As the present invention is to be applied to the rectilinearly-reciprocatory "head" of dictation-machines of the general type shown in said Macdonald Patent No. 1,100,024, and also in Patents Nos. 842,897, 874,973, 1,003,625, 1,067,933, and 1,100,755, it is unnecessary to set forth herein the various features of construction and arrangement there shown; and the present invention will be fully understood in connection with the prior patents aforesaid and the single figure of the annexed drawing.

This drawing is a plan view representing conventionally and in full lines a portion of a partly-recorded cylinder and the head with its diaphragm carrying the two styli (the latter indicated in dotted lines). The reproducing-position into which the diaphragm is shifted is indicated by dotted lines.

In the drawing, 1 indicates the cylinder; and 2 is the diaphragm, carried by the "head" 2^a, which is adapted to be shifted to-and-fro, as along the line 6—6, at right angles to the axis of the cylinder,—that is, from the position shown in full lines to that indicated by the dotted lines. To the diaphragm are secured, as by washer 3, the usual recording-stylus 4 and reproducing-stylus 5. But, instead of the two styli being located in the same transverse line (as 6—6, or other line at right angles to the axis of the cylinder), the recording-stylus 4 is placed somewhat in advance of the reproducing-stylus 5 (to the right, in the draw-

ing). The dotted line 8—8 indicates that portion of the surface of the tablet with which the recording-stylus and reproducing-stylus respectively will contact when in operative position.

The drawing is intended to indicate that the stylus 4 has recorded its helical record-groove around the first portion 7 of the cylinder,—leaving the remainder of the cylinder blank. If, now, the reproducing-stylus 5 be brought into position, 5' (by shifting head 2^a to the position indicated by dotted lines) it will engage the cylinder several grooves to the left of the blank portion, so as to reproduce the matter recorded in the last few grooves; and, thereafter, on restoring the recording-stylus 4 to position, there will be no danger of erasing any portion of the record already made.

The lateral displacement between the two styli may be (say) five record-grooves, or more or less (as desired). On the usual dictation-machine (cutting 160 threads to the inch), a lateral displacement of $\frac{1}{2}$ of an inch will locate the reproducing-stylus just five threads behind the recording-stylus; but these figures are given merely for illustration.

Although the invention has thus been fully described in detail, yet it is not limited to the precise construction and arrangement of parts above set forth, and may be embodied in various forms. For example, the record-tablet need not be in the form of a cylinder, and the two styli need not be arranged in the precise diagonal alinement shown, and the styli need not be carried directly by the diaphragm,—it being sufficient that the parts are so located that the reproducing-stylus when brought into operative contact with the tablet will engage the same at a point behind the position just occupied by the recording-stylus.

Having thus fully described the invention, what is claimed is:

1. A recorder-reproducer for dictation-

machines, comprising a rectilinearly-reciprocatory head having a recording-stylus and a reproducing-stylus located diagonally with respect to the direction of reciprocation. 50

2. A recorder-reproducer for dictation-machines, comprising a recording-stylus and a reproducing-stylus having a rectilinearly-reciprocatory movement, and located diagonally with respect to the direction of reciprocation. 55

3. A rectilinearly-reciprocatory recorder-reproducer system for dictation-machines, having the recording-stylus and the reproducing-stylus located diagonally of each other with respect to said rectilinear path. 60

4. A recorder-reproducer for dictation-machines, comprising a recording-stylus and a reproducing-stylus, said styli being so located with respect to each other that upon shifting into the reproducing-position said reproducing-stylus engages the record-groove in the rear of the termination thereof. 65

5. A recorder-reproducer for dictation-machines, comprising a recording-stylus and a reproducing-stylus, said styli being so located with respect to each other that upon shifting into the recording-position said recording-stylus engages the record-tablet in advance of the point in the record-groove from which said reproducing-stylus has just been removed. 70

6. A recorder-reproducer system for dictation-machines, comprising a recording-stylus and a reproducing-stylus mounted to be reciprocable in a path parallel to the tangent to the record-groove at the point of stylus-engagement therewith, the two styli being located diagonally of each other with respect to said path. 85

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CLINTON E. WOODS.

Witnesses:

C. A. L. MASSIE,
LAURETTA T. NEAL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

SPEED INDICATOR FOR TALKING MACHINES,
#1,219,112-----H. Kocourek,
Patented-March 13th, 1917.
FILED-January 2nd, 1915.

1,219,112.

Fig. 1.

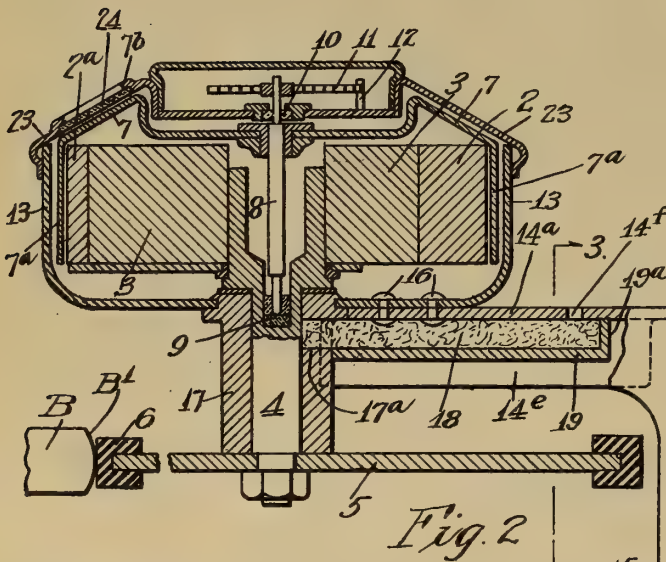
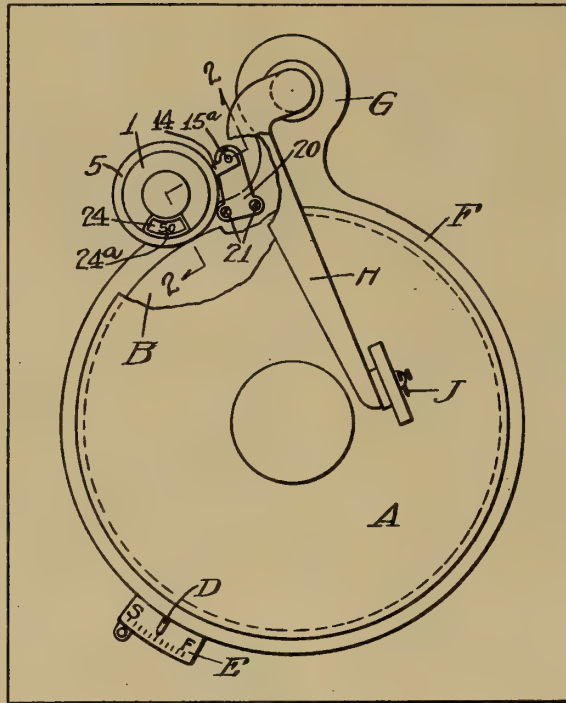


Fig. 2

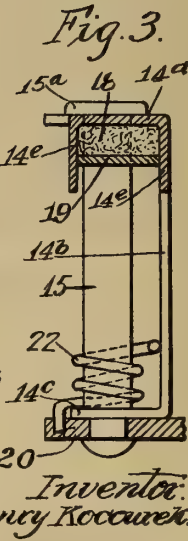


Fig. 3.

Robert H. Brewster.

Inventor
Henry Kocourek
by *Burton W. Burton*
his Atty

UNITED STATES PATENT OFFICE.

HENRY KOCOUREK, OF CHICAGO, ILLINOIS, ASSIGNOR TO STEWART-WARNER SPEEDOMETER CORPORATION, OF CHICAGO, ILLINOIS, A CORPORATION OF VIRGINIA.

SPEED-INDICATOR FOR TALKING-MACHINES.

1,219,112.

Specification of Letters Patent.

Patented Mar. 13, 1917.

Application filed January 2, 1915. Serial No. 211.

To all whom it may concern:

Be it known that I, HENRY KOCOUREK, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Speed-Indicators for Talking-Machines, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

This invention relates to a substantially designed speed indicator for showing the speed of operation of a phonograph. It consists of the features and elements described and shown in the drawings, as indicated by the claims.

In the drawings:

Figure 1 is a top plan view of a talking machine or "phonograph" showing a speed indicator embodying this invention applied thereto.

Fig. 2 is an enlarged detail section of the speedometer taken as indicated at line, 2—2, on Fig. 1.

Fig. 3 is a detail section taken as indicated at line, 3—3, on Fig. 2.

The talking machine illustrated in the drawings is the type in which a record disk, A, is carried upon a revolving table, B, usually driven by a spring motor whose winding crank is indicated at C. The speed of the motor is controlled usually by some form of centrifugal governor, not shown, and is rendered variable through a limited range by adjustment of such governor, the adjusting means being indicated as a combined handle and pointer, D, traversing a short scale, E. The mechanism of the particular machine illustrated is carried in a metal frame having an annular portion, F, which is circular in outline except for an extension, G, in which is carried the hollow arm, H, which supports the reproducing stylus, J, and its allied mechanism, and communicates with the sound amplifying chamber below the revolving table, B.

As is well understood, even a slight variation in the speed of revolution of the table, B, will cause a change of pitch in the sounds as reproduced by the instrument, and it is therefor desirable to know at what particular speed the table, B, is revolving so that the proper speed may be selected to produce the most pleasing results. The speed

indicator, 1, which is designed to serve this purpose is shown as the magnetic type comprising a ring magnet, 2, mounted on a non-magnetic core, 3, which is carried upon a rotatable shaft, 4, provided with a wheel, 5, whose rim carries a rubber tire, 6, for frictional engagement with the periphery, B¹, of the table, B. The magnet, 2, may be reduced in cross section at 2^a to throw out a portion of its flux into the adjacent space for creating a magnetic drag upon the non-magnetic drag disk, 7, which is shown carried on a spindle, 8, stepped in a jewel bearing, 9, which is carried in a hollowed out portion of the shaft, 4. An annular jewel bearing, 10, supports the upper end of the spindle to which is secured one end of a spiral biasing spring, 11, whose other end is fixed to a post, 12. The outer casing, 13, will preferably be composed of magnetic metal such as steel for the purpose of strengthening the magnetic field in which the cylindrical skirt, 7^a, of the drag disk, 7, hangs.

This mechanism is supported by a swinging arm, 14, formed of sheet metal, as indicated in Fig. 3, comprising a horizontal portion, 14^a, of inverted U-shaped cross section, one wall of which is extended to form the vertical portion, 14^b, carrying at its lower end the lug, 14^c, which pivotally engages the post, 15. The upper end of the post extends through the flat portion, 14^d, of the U, and is formed with a head, 15^a, to hold the arm, 14, in position. Rivets, 16, secure the casing, 13, to the top of the arm, 14, near its opposite end, while the flanged portions, 14^e, about the hub, 17, of the casing which serves as a journal bearing for the shaft, 4. The hub, 17, is provided with an aperture, 17^a, registering with the open end of the U-shaped arm, 14, and an oil wick, 18, is housed in this arm extending into said aperture, 17^a, being supported in position by a bottom wall, 19, held frictionally between the flanges, 14^e, and having its end bent up at 19^a to form a closure for the wick housing. The top of the arm, 14, is apertured at 14^f to permit renewal of the oil supply in the wick, 18.

The post, 15, is fixed upright in the mounting plate, 20, which is secured by two screws, 21, to the annular portion, F, of the metallic mounting of the phonograph mechanism, and the friction wheel, 5, is held

against the periphery of the revolving table, B, by means of a spring, 22, coiled about the post, 15, and having one end engaged in the plate, 20, while its opposite end reacts against the vertical wall, 14^b, of the arm, 14.

In the type of talking machine or phonograph illustrated, the revolving table, B, is substantially horizontal, as is the plane of revolution of the magnet, 2. As is well understood the drag disk, 7, is rotatably displaced from a normal position by an amount proportional to the speed of rotation of the magnet, 2; graduations carried by the drag disk, 7, may thus be compared with the fixed position of a zero line to indicate the speed of rotation measured by the instrument. To render such graduations easily read they are placed upon a surface of the cup-shaped disk, 7, which extends at an obtuse angle to the skirt, 7^a, as shown at 7^b, and a similarly sloping cover, 23, of the instrument is provided with a window, 24, through which such graduations may be observed. Preferably an index point, 24^a, is formed in the outline of the window, 24, as shown in Fig. 1.

I claim:—

1. In a speed indicator comprising a casing, a vertical shaft therein; a journal bearing for said shaft at the lower portion of said casing, and a supporting arm secured to the casing and extending transversely of said shaft, said journal bearing having an aperture and said arm being hollow with its bore connecting with said aperture, and an oil wick in said hollow arm extending into

said aperture, the arm having an aperture beyond the casing to admit oil to said wick.

2. In combination with a speed indicator, a support for the purpose indicated comprising a pivot post and an arm of sheet metal having a portion which extends parallel to said post with one edge bent at right angles to said portion and pivotally engaging the post, and with a lug bent at right angles to said portion at its opposite edge also pivotally engaging said post, and means securing the speed indicator casing to the said bent edge of the arm at the end opposite the pivot post.

3. In combination with a speed indicator, a support for the purpose indicated, comprising a pivot post and a bracket of sheet metal comprising two arms substantially at right angles to each other, one of said arms being folded into channel form, one side of the channel comprising the other arm, the remote end of said other arm being bent to form a lug parallel with the web of said channel, said web and said lug being pivotally engaged with the post, and the end of said channel remote from the pivot being provided with means for securing the speed-indicator casing thereto.

In testimony whereof, I have hereunto set my hand at Chicago, Illinois, this 24th day of December, 1914.

HENRY KOCOUREK.

Witnesses:

ROBT. N. BURTON,
EDNA M. MACINTOSH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D C."

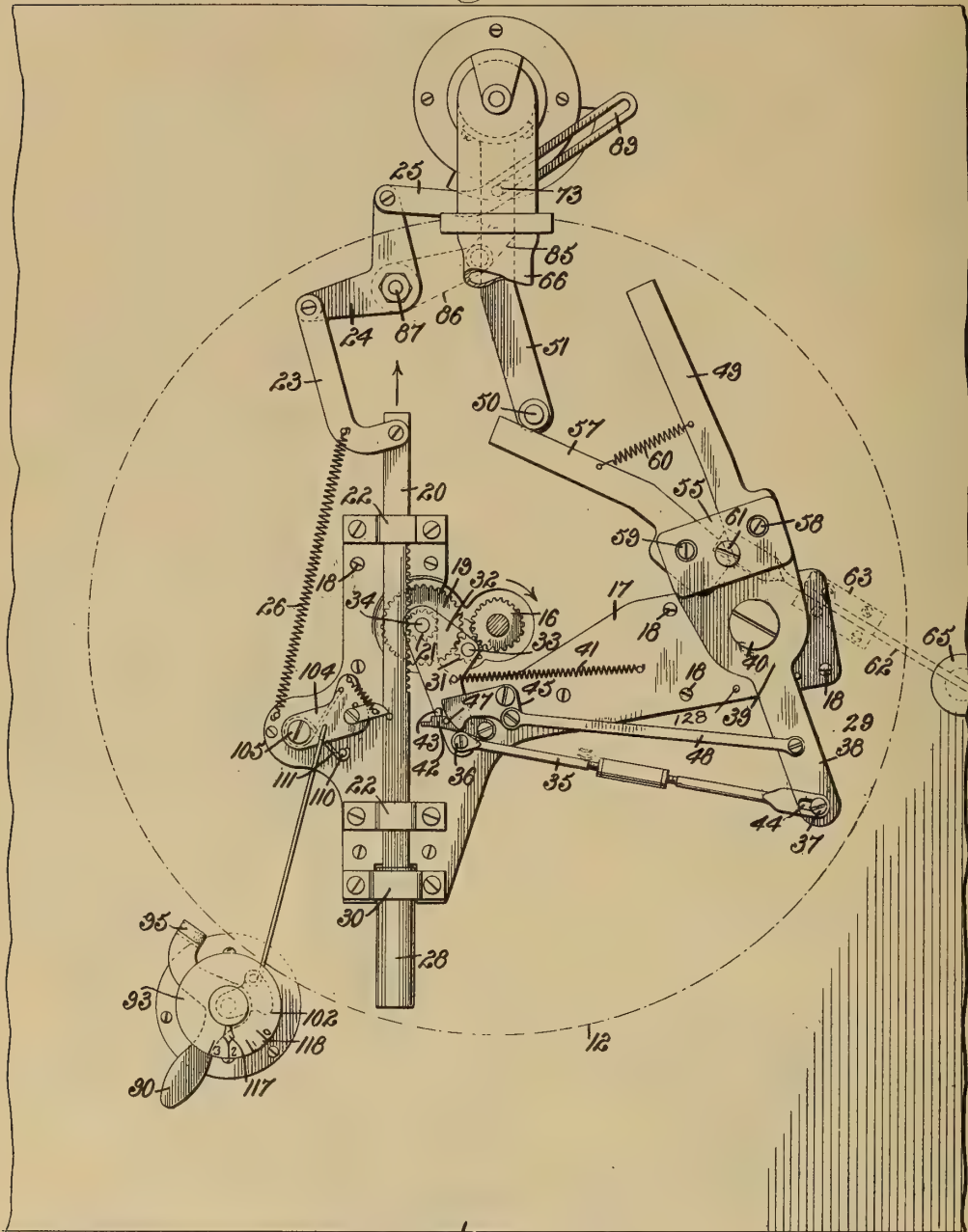
REPEATER FOR TALKING MACHINES,
#1,219,144-----J. Para,
Patented-March 13th, 1917.
Filed-June 21st, 1916.

J. PARA.
 REPEATER FOR TALKING MACHINES.
 APPLICATION FILED JUNE 21, 1916.

1,219,144.

Patented Mar. 13, 1917.
 5 SHEETS—SHEET 2.

Fig. 2.



WITNESSES

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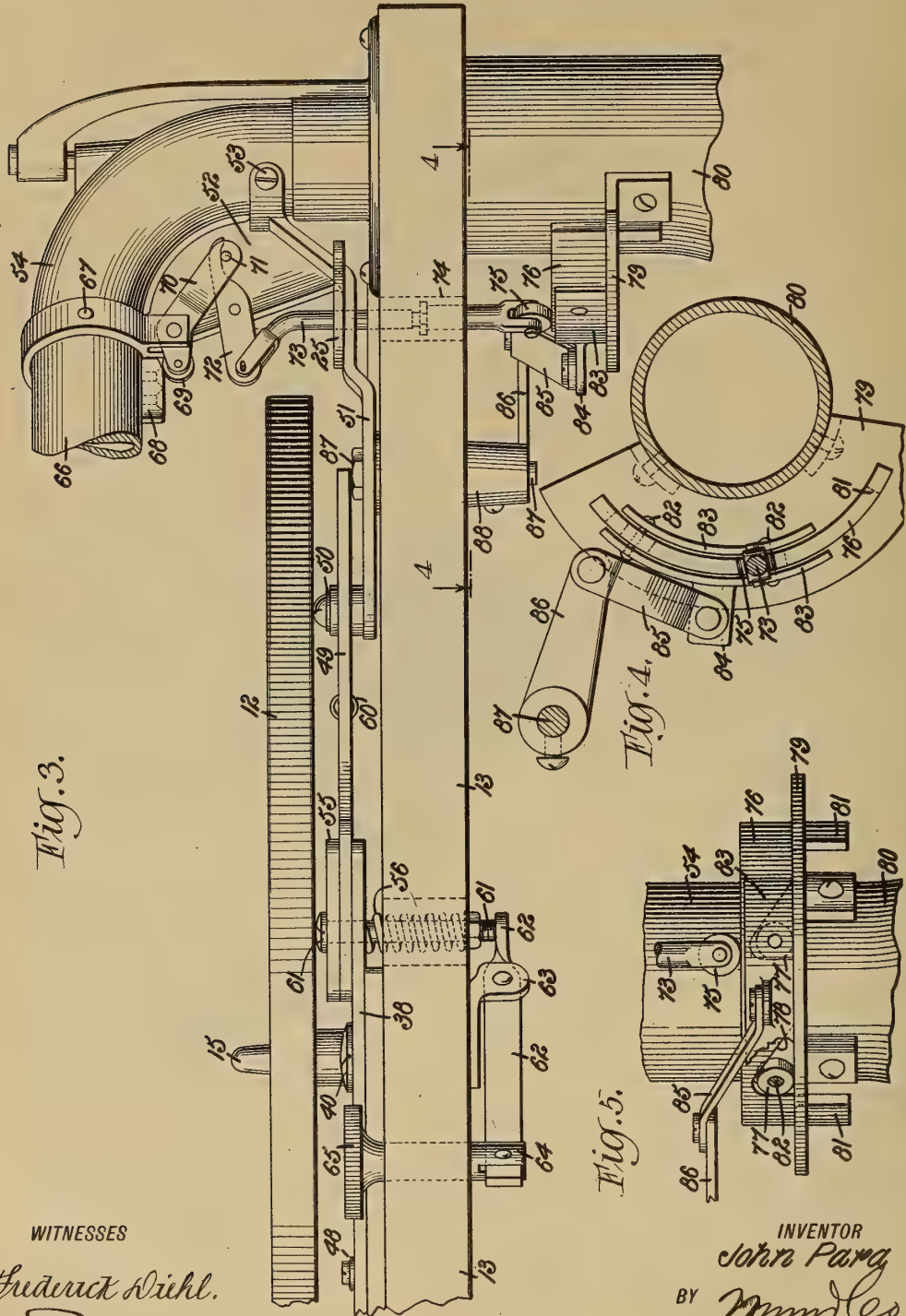


Fig. 3.

Fig. 4.

Fig. 5.

WITNESSES

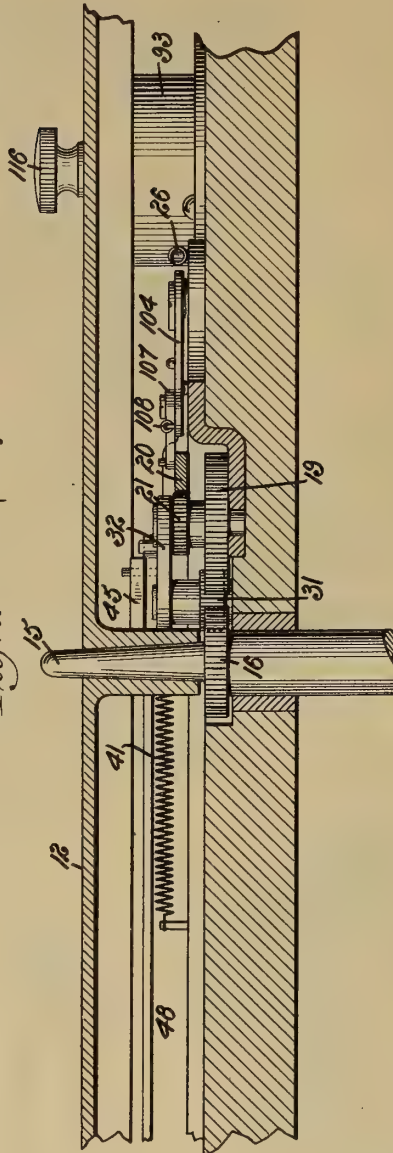
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 5 SHEETS—SHEET 5.

Fig. 11.

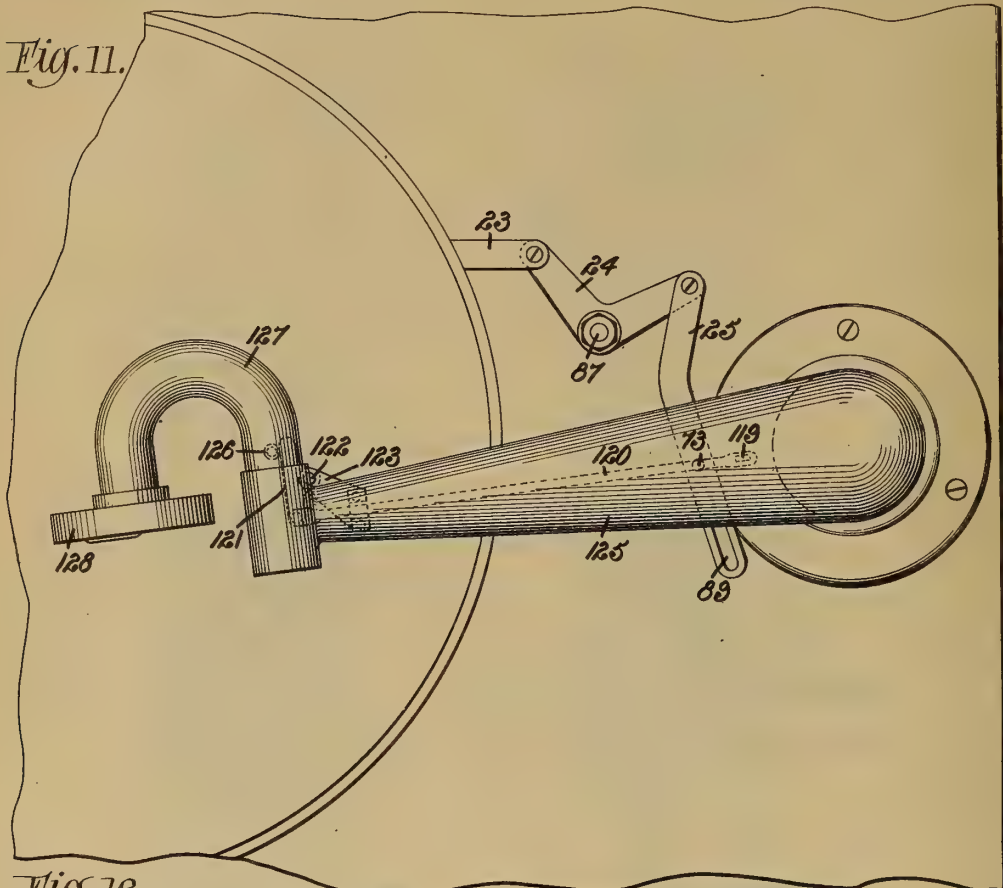
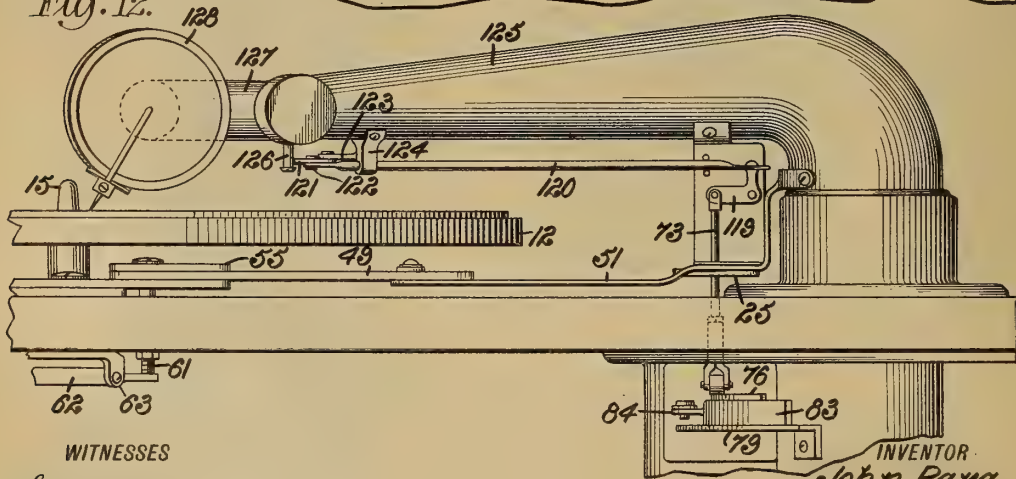


Fig. 12.



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REPEATER FOR TALKING-MACHINES.

1,219,144.

Specification of Letters Patent.

Patented Mar. 13, 1917.

Application filed June 21, 1916. Serial No. 104,973.

To all whom it may concern:

Be it known that I, JOHN PARA, a citizen of the United States, and a resident of Elizabeth, in the county of Union and State of New Jersey, have invented a new and Improved Repeater for Talking-Machines, of which the following is a full, clear, and exact description.

Among the principal objects which the present invention has in view are: to automatically replace the recording needle used in talking machines at the beginning of a record groove of a record disk; to automatically control the number of repetitions and the operation of the mechanism effecting the same; to set the mechanism to a point where it is intended that the repetition should be inaugurated; and to avoid discordant, harsh, or violent sounds when disengaging the needle from and when engaging it with the record disk.

Drawings.

Figure 1 is a top plan view of a repeater of the character mentioned constructed and arranged in accordance with the present invention, the rotary table for supporting the record disk being removed, and showing the parts in their normal or inactive position;

Fig. 2 is a similar view showing the parts actively disposed;

Fig. 3 is a side view of said mechanism, and showing in conjunction therewith, fragments of the tone arm, machine top, and record table, the same being shown on an enlarged scale;

Fig. 4 is a section taken as on the line 4—4 in Fig. 3;

Fig. 5 is a side view of a fragment of a resonating horn and an elevating table connected therewith for operating the needle-lifting mechanism;

Fig. 6 is a longitudinal section on an enlarged scale, the section being taken as on the line 6—6 in Fig. 1;

Fig. 7 is a vertical section taken as on the line 7—7 in Fig. 6.

Fig. 8 is a horizontal section of the brake mechanism with which the talking machine is provided, the section being taken as on the line 8—8 in Fig. 9;

Fig. 9 is a vertical section taken as on the line 9—9 in Fig. 8;

Fig. 10 is a vertical section taken as on the line 10—10 in Fig. 8;

Fig. 11 is a top plan view of a talking machine of conventional type having attached thereto a modified form of the lifting mechanism;

Fig. 12 is a side view of the same.

Description.

As seen in the drawings, the repeater comprises a mechanism permanently installed on a talking machine. The major portion of the mechanism is preferably disposed between the rotary table 12 and the case top 13, as best seen in Fig. 6 of the drawings. Upon the motor shaft 14, and at the base of the pintle end 15 whereof the table 12 is mounted, is rigidly secured a gear wheel 16, by which the repeater mechanism is actuated.

The mechanism referred to is mounted on a base plate 17, which is permanently secured by screws 18, to the top 13. A driving wheel 19 and rack bar 20 are mounted on the said base plate, and are operatively connected by a pinion 21 rigidly secured on the wheel 19. The teeth of the pinion 21 are permanently meshed with the toothed section of the bar 20. The bar 20 is slidably mounted in bearings 22. The forward end of the said bar is operatively connected with a link 23. The link 23 connects a bell crank lever 24 and the slotted link 25 pivotally mounted thereon, with the said rack bar.

The rack bar 20 and link 23 connected therewith, are normally retracted by a spring 26. The speed with which the bar 20 is retracted is regulated by an opening 27 in a dash pot 28. To this end, the bar 20 enters the dash pot and is provided with a piston 29 in the said dash pot. A suitable valve mechanism is employed for permitting the free entrance of air to the dash pot while retarding the exhaust thereof, or, in other words, the rod 20 is held free to move forward and is controlled in its retractive movement. The dash pot is held rigidly on the plate 17 by means of straps 30.

To move the bar 20 forward in the direction indicated by arrows in Figs. 1 and 2, the wheel 19 is operatively connected with the wheel 16 by means of a pinion 31. For

this purpose, the pinion 31 is rotatively supported on a rocking plate 32, a stud shaft 33 being employed to support the wheel thereon. The plate 32 is pivotally mounted by the shaft 34 of the wheel 19, which plate is rocked by means of an adjustable rod 35. The rod 35 is pivotally connected with said plate 32, by a screw pin 36, while the opposite end of said rod has a sliding connection with a pin 37 in the tail-piece 38 of the rocking plate 39. The plate 39 is pivotally held on the plate 17 by the screw 40.

The plate 32 is moved by a spring 41, to the position as shown in Fig. 2 of the drawings, where the pinion 31 engages the wheels 16 and 19 to transmit the forward movement to the bar 20. The function of the rod 35 is to rock the plate 32 to disengage the pinion 31 from the wheel 16, when the plate 39 is rocked to move the tail-piece 38 in a direction commensurate with this action.

When thus rocked, the plate 32 is held by a spring-actuated latch 42, which engages a pin 43 to hold the plate in the position described.

It will be understood when the plate 32 is thus moved and during the period when the latch 42 holds said plate, when the pinion 31 is disengaged from the wheel 16, that the spring 26 operates to retract the bar 20 and parts connected therewith, and at a rate of speed regulated by the operation of the dash pot 28.

By reference to the drawings, Fig. 1, it will be observed that in said figure, the rod 20 and parts connected therewith have been fully retracted, and the plate 32 is held by the latch 42 and pin 43 in position where the pinion 31 is disengaged from the wheel 16. This is the result of the operation of the parts above described, and particularly of the spring 26 connected therewith. It will also be observed that the plate 39 has been rocked on the screw 40, to move the tail-piece 38 inward, and that the screw 37 on the said tail-piece reposes at the inner end of a slot 44 with which the bar 45 is furnished to permit the necessary amount of lost motion at this point.

It will also be observed that a trigger plate 45 has been rocked on its pivot 46, so that the cam-shaped head thereof has been removed from a pin 47 on the latch 42, to permit the same to move forward to engage the pin 43 on the plate 32. The plate 45 is operated through the medium of a connecting rod 48, which is operatively connected with the tail-piece 38.

To the position just above described as shown in Fig. 1 of the drawings, the plate 39 has been moved by pressure exerted on the arm 49 by a roller-provided pin 50 at the end of an actuating arm 51. As best

shown in Fig. 3 of the drawings, the arm 51 is extended from a bracket 52, which is rigidly secured by screws 53, to the tone arm 54 of the talking machine. It is obvious that the arm 51 moves with the tone arm 54, and that the position of the pin 50 has a definite relation at all times with the said tone arm. Therefore, when the needle or stylus of the reproducer of a talking machine is in position to enter a record groove on a record disk, the arm 49 must be adjusted to engage the pin 50 irrespective of the position of the plate 39. To this end, the said arm 49 is pivoted on the plate 39, and is held in frictional engagement therewith by a clamp plate 55.

The plate 55 is normally held by a spring 56 to fix the adjusted position of the arms 49 and 57. The arms 49 and 57 turn on the pivots 58 and 59. These arms are normally drawn together by a spring 60. The inactive disposition of the arms is illustrated in Fig. 1 of the drawings, where the said arms are both in contact with the roller on the pin 50.

When setting the arms 49 and 57, the retaining pin 61 is lifted, the spring 56 being compressed in this operation. To lift the pin 61, a lever 62 is employed, which lever is pivoted in a bracket 63 secured to the under side of the top 13 and to a plunger 64. The plunger 64 is depressed by the operator resting his finger on the exposed head 65.

In the drawings, the type of tone arm illustrated is that which has a pivoted section 66, the forward end of which may be elevated and depressed above and upon the table 12 and a record disk thereon. The section 66 swings on pivots 67, which are shown best in Fig. 3.

When adapting the repeater mechanism to machines having this type of tone arm, the section 66 is provided with a plate 68, which is normally supported upon a roller 69 mounted in the short end of a lever 70. The long end of the lever has a pin 71, which is engaged by the end of a rocking lever 72. The rocking lever 72 is pivotally connected with a lifter 73. The lifter 73 passes freely through a perforation in the arm 51 and through an opening 74 in the top 13. At the lower end of the lifter 73, a roller 75 is provided, which roller tracks on a rail 76. The rail 76 is elevated when the rollers 77 are forced under the inclines 78 with which the said rail is provided. The rail 76 and rollers 77 are normally supported on the bench 79 rigidly secured to and set out from the resonating horn 80. The position of the rail 76 in relation to the bench 79 is maintained definitely by the pendent arms 81 with which said rail is provided. The bench 79 is perforated to permit the extension there-

through of the arms 81, as best seen in Fig. 5 of the drawings. The rollers 77 are mounted on shaft pins 82, the ends whereof are rigidly secured to side bars 83. The side bars 83 and rail 76 are concentric with the horn 80, as shown best in Fig. 4 of the drawings.

To shift the carriage formed by the side bars 83, shaft pins 82, and rollers 77, the outer side bar 83 is provided with a connecting lug 84, which is pivotally attached to and supports one end of a connecting link 85. The link 85 is engaged by the arm 86 of a rocking shaft 87. The shaft 87 passes through a bearing boss 88 and the top 13 supporting the said boss. To the upper end of the shaft 87 is rigidly connected the lever 24, which, as previously indicated, is rocked by the operation of the bar 20, when the same is advanced in the direction of the arrow associated with the said bar in Fig. 2 of the drawings, which happens when the pinion 31 is moved into engagement with the wheel 16, as above indicated. As shown in Fig. 2, this occurs when the arm 51 and roller pin 50 thereon have engaged the arm 57 and rocked the plate 39.

It will be observed that the slot 89 in the link 25 is sufficiently long to provide that the end thereof does not engage the lifter 73 until the lever 24 and shaft 87 connected therewith have been rocked to advance the arm 86, the link 85, and side bars 83 connected therewith, so that the rollers 77 have elevated the lifter 73, to the end that the pivoted section 66 is lifted by the operation of the lever 70 and roller 69 thereon.

Coinciding in time with this operation, the inner end of the slot 89 engages the lifter 73, with the result that the continued movement of the bar 20 and lever 24 forces said lifter and parts connected therewith, including the pivoted section 66, to the point where the roller on the pin 50 engages the arm 49 of the plate 39, to rock said plate in the opposite direction to disengage the pinion 31 from the wheel 16.

The present invention provides for repeating the use of a record a number of times. To this end, a brake-setting mechanism is provided which operates step by step and in accordance with a predetermined adjustment. The brake lever 90 is pivotally mounted on a shaft 91, as shown best in Fig. 8 of the drawings. A spring 92 is wrapped on the shaft 91, and said spring is anchored at one end in a case 93, and the other end engages a pin 94 on the brake lever adjacent the brake shoe 95 thereof. When unrestrained, the spring 92 seats the shoe 95 against the edge of the table 12 in a manner conventional to machines of the character here mentioned.

To restrain the operation of the spring 92 and to hold the shoe 95 away from the said

table 12, is the function of a rocking lever 96 mounted on a shaft 97 supported by the side wall of the case 93, as seen best in Fig. 9 of the drawings.

The lever 96 has at the upper end thereof, a cross head 98, which is extensible in the path of a pin 99 extended from the under side of the lever 90. The lever 96 is rocked on its pivot 97, to insert the cross head 98 in the path of the pin 99 when the disk 100 is rotated under the wheel 101 with which the lower end of the said lever is provided.

The disk 100 above mentioned is moved by a sector 102. As shown best in Fig. 1, the sector 102 is operatively connected by a rod 103, with a latch plate 104 pivotally mounted by a screw 105 on the base plate 17. The plate 104 is rocked on its pivot when a pin 106 on the bar 20 engages a latch 107, which happens each time the bar 20 is moved forward by the mechanism, using the wheel 16 as a driving wheel. The latch 107 is provided with a spring 108, which normally returns the latch 107 to rest against a stop pin 109. The latch 107 yields to permit the passage of the pin 106 when the bar 20 is retracted. The latch plate 104 is normally held by a pin 110 when retracted by a spring 111. It is obvious that repeated reciprocations of the rod 103 result in successive engagement by the pawl 112, of the teeth on the extension 113, which rotates the disk 100 in correspondence with the reciprocation of the rod 103 and the bar 20.

The teeth of the extension above mentioned are so arranged that when the pawl 112 moves the disk 100 by engaging the last of the said teeth, the said disk is then moved from under the roller 101 and the spring 92 is then permitted to revolve the lever 90 to seat the shaft 95 against the edge of the table 12. The lever 90 in moving to seat the brake, rocks the lever 96 to the extent that the head 98 is removed from the path of the pin 99 on the lever.

To free the disk 100 from engagement with the pawl 112, so that the disk may be set for the following operation, the lever 90 has a dependent arm 114, on the end whereof a shoe 115 is mounted, which shoe wedges in front of a pin on the pawl 112, to move the spur of the said pawl out of engagement with the teeth of the extension 113. The disk 100 is now free to be adjusted, which is accomplished by the operator manipulating the milled nut 116 to move the pointer 117 to register with the calibration 118 on the top of the case 93.

Operation.

When a talking machine is provided with a repeater mechanism such as above described, the operation is as follows: The attendant after placing on the table 12, a record disk, depresses the head 65. This re-

lieves the pressure of the spring 56 on the plate 55, and permits the spring 60 to draw the arms 49 and 57 into contact with the roller of the pin 50. After now releasing the head 65, the attendant moves the tone arm and section 66 thereof until the needle or stylus of the sound box is disposed at the entrance end of the record groove of the record disk. The plate 55 presses on the arms 49 and 57, causing the same to frictionally engage the plate 39 which is moved with the arm 49 as the same is carried outward by the pin 50 in correspondence with the setting of the needle with reference to the record groove of the record disk. The plate 39 and tail-piece 38 thereof, is arrested by the stop pin 128 prior to the suspension of movement of the arm 49, which in the last end of the movement of the pin 50, is forcibly moved overcoming the friction of the plate 55. It will be noted at this time that force being applied by the pin 50 on the arm 49 only, the arm 57 is detained during the last part of the adjusting movement of the tone arm and pin 50 operatively connected therewith when setting the reproducing needle at the entrance end of the record groove.

It will be observed that when the movement of the plate 39 and the tail-piece 38 thereof is arrested by the pin 128, the plate 45 has been rocked to disengage the latch 42 from the pin 43, and that the plate 32 has been moved to disengage the gear wheel 16 and pinion 31, or, in other words, the release of the shifting mechanism is insured when the reproducing needle is thereafter moved to align with the entrance end of the record groove.

The tone arm and reproducing needle carried thereby are now moved to positions where the reproducing needle coincides with the finishing end of the record groove.

The plate 55 operating on the arms 49, 57 and 39 retain them in the positions above described and as shown in Fig. 1 of the drawings. The arm 57 being now engaged by the pin 50, the plate 39, tail-piece 38 thereof, and rods 35 and 48 connected therewith are swung about the pivot screw 40 until the tail-piece 38 engages a stop pin 129. It will be observed that in this action, the arm 49 is moved to a position nearer the center of the record groove than that to which it was previously moved when setting it for operating.

When the plate 39 and parts connected therewith are now arrested by the pin 129, the continued movement of the tone arm, record needle connected therewith, and pin 50, operatively connected with said tone arm, forcibly separates the arm 57 to a further degree from the arm 49 and to a position where it coincides with the operating position of the reproducing needle of the talking machine at the end of the record groove.

It will be observed that when adjusting the arm as above described, the plate 39 and tail-piece 38 connected therewith are rocked to engage the stop pin 129, the rods 48 and 35 functioning to remove the latch 42 from engagement with the pin 43, to permit the spring 41 to rock the plate 32 and pinion 31 thereon to engage the said pinion with the gear wheel 16. This, it will be observed, is the operating position for the transmission mechanism. It will likewise be observed that the power mechanism not being released at the time of setting the record needle, the engagement of the pinion 31 and gear wheel 16 has no effect. The talking machine and the repeating mechanism are now in position for operation. The arms 49 and 57 will thereafter remain in the positions substantially as shown in Fig. 2 of the drawings. The attendant now engages the milled nut 116, and uses the same for turning the pointer 117 to register with one or other of the markings on the calibration 118. These markings will indicate whether the repetition is to be once, twice, or more times. The tone arm having been returned to the starting position, the attendant releases the brake, using the lever 90 for this purpose.

In the backward movement of the lever 90, the pin 99 passes over the head 98 of the lever 96, the said lever yielding to that effect. When the attendant shifted the pointer 117, he moved the disk 100 under the wheel 101 on the said lever 96, which is now in position to hold the lever 90 in its retracted or open-brake position.

The motor of the talking machine now revolves the table 12, and the record disk thereon. The record groove in said disk swings the end of the tone arm toward the center of the said disk, and in so doing, moves the pin 50 to engage the arm 57. The further movement of the tone arm 54 and parts connected therewith, and of the arm 51, rocks the plate 39, and through the medium of the rod 35 and plate 32, places the pinion 31 in engagement with the wheel 16.

Immediately on engaging the pinion 31 and wheel 16, the rack bar 20 is moved forward. The arm 86 operates to first elevate the lifter 73 and the outer end of the section 66. This prepares the said section 66 for the engagement of the link 25 with the lifter 73, and the movement of the tone arm and parts connected therewith to adjacent the outer edge of the record disk, where the needle of the tone box registers with the first or outermost convolution of the record slot.

Just prior to the termination of the outer movement of the tone arm, the roller on the pin 50 engages the arm 49, and by means of it, rocks the plate 39 to disengage the pinion 31 from the wheel 16. As previously stated, this action permits the spring 26 to

retract the bar 20, lever 24, arm 86, and parts connected therewith. The rapidity of this movement is modified by the dash pot 28 in the manner above indicated, with the result that the outer end of the section 66 and the sound box mounted thereon, are lowered until the needle engages the record disk, thereby avoiding a sudden engagement of the disk by the said needle.

It will be observed that as the bar 20 was advanced on the first occasion, the pin 106 operated the plate 104 and the sector 102 connected therewith, to rotate the disk 100 a single step. It will be understood that when now the mechanism is again actuated at the completion of the second repetition, the bar 20 will be advanced and the sector 102 rotated another step. If the pointer 117 has been adjusted to indicate two repetitions, the second advance of the sector 102 will carry the disk 100 from engagement with the roller 101 and permit the lever 96 to release the pin 99 and brake lever 90 connected therewith. The spring 92 will immediately set the brake and arrest the table 12 and sustain the operation of the talking machine.

In Figs. 12 and 13, there is shown a modified form of the mechanism which is adapted for lifting the tone tube and sound box attached thereto when constructed and arranged in accordance with what is known as the Victor type of talking machine. The modification consists in providing the lifter 73 and in attaching the same to a bell crank. The short arm of the bell crank 119 is connected by a rod 120 to a rocking lever 121. As shown best in Fig. 11, the rocking lever 121 is pivoted by a pin 122 on a bracket 123. The bracket 123 has a body portion 124, by which it is secured to the tone arm 125. The body portion 124 furnishes a guide bearing for the rod 120 when the same is reciprocated by the operation of the lever 119.

The rocking lever 121 normally engages a pin 126 pendent from the under side of the pivotal extension of the tone tube 127.

The operation of the modified form of the mechanism is as follows: When the lifter 73 is elevated by the rail 76, the lever 119 is rocked to draw the rod 120 rearwardly. The lever 121 is thereby rocked on its pin 122, with the result that the free end of the lever 121 presses forwardly upon the pin 126 to rotate the pivotal extension of the tube 127, so that the end of said tube carrying the sound box 128 is elevated.

Claims.

1. A repeater as characterized comprising a transmission mechanism permanently disposed on the frame of a talking machine; means for temporarily operatively engaging and disengaging said transmission mechanism and the driving shaft of a talking machine, said means embodying a member moved in correspondence with the tone arm of said talking machine; means for operatively connecting said transmission mechanism and said tone arm for returning the tone arm to its initiatory position.

2. A repeater as characterized comprising a transmission mechanism permanently disposed on the frame of a talking machine; means for temporarily operatively engaging and disengaging said transmission mechanism and the driving shaft of a talking machine, said means embodying a member moved in correspondence with the tone arm of said talking machine; and means for operatively connecting said transmission mechanism and said tone arm for returning the tone arm to its initiatory position.

3. A repeater as characterized comprising a transmission mechanism permanently disposed on the frame of a talking machine; means for temporarily operatively engaging and disengaging said transmission mechanism and the driving shaft of a talking machine, said means embodying a member moved in correspondence with the tone arm of said talking machine; means for operatively connecting said transmission mechanism and said tone arm for returning the tone arm to its initial position; and automatic means for returning the transmission mechanism to its initial position when disengaged from said driving shaft.

4. A repeater as characterized comprising a transmission mechanism permanently disposed on the frame of a talking machine; means for temporarily operatively engaging and disengaging said transmission mechanism and the driving shaft of a talking machine, said means embodying a member moved in correspondence with the tone arm of said talking machine; means for operatively connecting said transmission mechanism and said tone arm for returning the tone arm to its initial position; automatic means for returning the transmission mechanism to its initial position when disengaged from said driving shaft; and means for regulating the speed of retraction of said transmission mechanism.

5. A repeater as characterized comprising a transmission mechanism permanently disposed on the frame of a talking machine; means for temporarily operatively engaging and disengaging said transmission mechanism and the driving shaft of a talking machine, said means embodying a member moved in correspondence with the tone arm of said talking machine; means for operatively connecting said transmission mechanism and said tone arm for returning the tone arm to its initial position; automatic means for returning the transmission mechanism to its initial position when disengaged from said driving shaft; and means for regulating the speed of retraction of said transmission mechanism.

6. A repeater as characterized comprising a transmission mechanism permanently disposed on the frame of a talking machine; means for temporarily operatively engaging and disengaging said transmission mechanism and the driving shaft of a talking machine, said means embodying a member moved in correspondence with the tone arm of said talking machine; means for operatively connecting said transmission mechanism and said tone arm for returning the tone arm to its initial position; automatic means for returning the transmission mechanism to its initial position when disengaged from said driving shaft; and means for regulating the speed of retraction of said transmission mechanism.

nism and said tone arm for returning the tone arm to its initial position; automatic means for returning the transmission mechanism to its initial position when disengaged from said driving shaft; and means for regulating the speed of retraction of said transmission mechanism, said means embodying a dash pot operatively connected with a plunger of said transmission mechanism.

6. A repeater as characterized comprising a transmission mechanism permanently disposed on the frame of a talking machine; means for temporarily operatively engaging and disengaging said transmission mechanism and the driving shaft of the talking machine, said means embodying a member moved in correspondence with the tone arm of said talking machine; means for operatively connecting said transmission mechanism and said tone arm for returning the tone arm to its initial position; automatic means for returning the transmission mechanism to its initial position when disengaged from said driving shaft; and means for regulating the speed of retraction of said transmission mechanism, said means embodying a mechanism for yielding slowly in the direction of retraction.

7. A repeater as characterized comprising a transmission mechanism permanently disposed on the frame of a talking machine; means for temporarily operatively engaging and disengaging said transmission mechanism and the driving shaft of the talking machine; means for operatively connecting said transmission mechanism and said tone arm for returning the tone arm to its initial position; automatic means for returning the transmission mechanism to its initial position when disengaged from said driving shaft; a turn-table for supporting record disks; a brake for arresting said turn-table; means for restraining said brake; and means operatively connecting said transmission mechanism and said restraining means for actuating the same to release said brake.

8. A repeater as characterized comprising a transmission mechanism permanently disposed on the frame of a talking machine; means for temporarily operatively engaging and disengaging said transmission mechanism and the driving shaft of the talking machine, said means embodying a member moved in correspondence with the tone arm of said talking machine; means for operatively connecting said transmission mechanism and said tone arm for returning the tone arm to its initial position; a turn-table for supporting record disks; a brake for arresting said turn-table; means for restraining said brake, said means being adapted for movement progressively toward a releasing position; and means operatively connecting said restraining means and trans-

mission mechanism for progressively operating said restraining means in correspondence with the operations of said transmission mechanism.

9. A repeater as characterized comprising a transmission mechanism permanently disposed on the frame of a talking machine; means for temporarily operatively engaging and disengaging said transmission mechanism and the driving shaft of the talking machine; means for operatively connecting said transmission mechanism and said tone arm for returning the tone arm to its initial position; automatic means for returning the transmission mechanism to its initial position when disengaged from said driving shaft; a turn-table for supporting record disks; a brake for arresting said turn-table; a restraining mechanism for said brake, embodying a releasing mechanism operated step by step to releasing position; and means operatively connecting said transmission mechanism and said releasing mechanism for operating said releasing mechanism step by step toward the releasing position thereof.

10. A repeater as characterized comprising a transmission mechanism permanently disposed on the frame of a talking machine; means for temporarily operatively engaging and disengaging said transmission mechanism and the driving shaft of the talking machine; means for operatively connecting said transmission mechanism and said tone arm for returning said tone arm to its initial position; automatic means for returning the transmission mechanism to its initial position when disengaged from said driving shaft; a turn-table for supporting record disks; a brake for arresting said turn-table; a restraining mechanism for said brake, embodying a releasing mechanism operated step by step to releasing position; means operatively connecting said transmission mechanism and said releasing mechanism for operating said releasing mechanism step by step toward the releasing position thereof; and means for manually adjusting said releasing mechanism for determining the number of operations necessary to release said brake.

11. A repeater as characterized comprising a transmission mechanism permanently disposed on the frame of a talking machine; means for operatively connecting said transmission mechanism and the tone arm of said talking machine for returning the tone arm to its initiatory position, said means embodying a transmission train consisting of a driving wheel mounted on said driving shaft, a driving wheel of said transmission mechanism, and a roving pinion adapted to be moved into engagement with said driving wheels; and means for temporarily operatively engaging and disengaging said

transmission mechanism and the driving shaft of the talking machine, said means embodying a member moved in correspondence with the tone arm of said talking machine.

12. A repeater as characterized comprising a transmission mechanism permanently disposed on the frame of a talking machine; means for operatively connecting said transmission mechanism and the tone arm of said talking machine for returning the tone arm to its initiatory position, said means embodying a transmission train consisting of a driving wheel mounted on said driving shaft, a driving wheel of said transmission mechanism, and a roving pinion adapted to be moved into engagement with said driving wheels; and means for temporarily operatively engaging and disengaging said transmission mechanism and the driving shaft of the talking machine, said means embodying a rocking member having separated arms for engagement by a member mounted on said tone arm in correspondence with the initiatory and final positions thereof.

13. A repeater as characterized comprising a transmission mechanism permanently disposed on the frame of a talking machine; means for operatively connecting said transmission mechanism and the tone arm of said talking machine for returning the tone arm to its initiatory position, said means embodying a transmission train consisting of a driving wheel mounted on said driving shaft, a driving wheel of said transmission mechanism, and a roving pinion adapted to be moved into engagement with said driving wheels; and means for temporarily operatively engaging and disengaging said transmission mechanism and the driving shaft of the talking machine, said means embodying a rocking member having separable arms for engagement by a member operated with said tone arm and at positions corresponding with the initiatory and final positions of said tone arm.

14. A repeater as characterized comprising a transmission mechanism permanently disposed on the frame of a talking machine; means for operatively connecting said transmission mechanism and the tone arm of said talking machine for returning the tone arm to its initiatory position, said means embodying a transmission train consisting of a driving wheel mounted on said driving shaft, a driving wheel of said transmission mechanism, and a roving pinion adapted to be moved into engagement with said driving wheels; means for temporarily operatively engaging and disengaging said transmission mechanism and the driving shaft of the talking machine, said means embodying a rocking member having separable arms for engagement by a member operated with said tone arm and at posi-

tions corresponding with the initiatory and final positions of said tone arm; and means for locking said arms in their adjusted position.

15. A repeater as characterized comprising a transmission mechanism permanently disposed on the frame of a talking machine; means for operatively connecting said transmission mechanism and the tone arm of said talking machine for returning the tone arm to its initiatory position, said means embodying a transmission train consisting of a driving wheel mounted on said driving shaft, a driving wheel of said transmission mechanism, and a roving pinion adapted to be moved into engagement with said driving wheels; means for temporarily operatively engaging and disengaging said transmission mechanism and the driving shaft of the talking machine, said means embodying a rocking member having separable arms for engagement by a member operated with said tone arm and at positions corresponding with the initiatory and final positions of said tone arm; means for locking said arms in their adjusted position; and means for closing said arms for engaging said member when released from the locking means.

16. A repeater as characterized comprising a transmission mechanism permanently disposed on the frame of a talking machine; means for operatively connecting said transmission mechanism and the tone arm of said talking machine for returning the tone arm to its initiatory position, said means embodying a transmission train consisting of a driving wheel mounted on said driving shaft, a driving wheel of said transmission mechanism and a roving pinion adapted to be moved into engagement with said driving wheels; means for temporarily operatively engaging and disengaging said transmission mechanism and the driving shaft of the talking machine, said means embodying a rocking member having separable arms for engagement by a member operated with said tone arm and at positions corresponding with the initiatory and final positions of said tone arm; means for locking said arms in their adjusted position; means for closing said arms for engaging said member when released from the locking means; and manually operative means for releasing said arms.

17. A repeater as characterized comprising a transmission mechanism permanently disposed on the frame of a talking machine; means for temporarily operatively engaging and disengaging said transmission mechanism and the driving shaft of a talking machine, said means embodying a member moved in correspondence with the tone arm of said talking machine; means for operatively connecting said transmission mecha-

nism and said tone arm for returning the tone arm to its initiatory position; and means operable by said transmission mechanism for lifting a sound-box mounted on
5 said tone arm from the record groove prior to the movement of said tone arm toward the initiatory position thereof.

18. A repeater as characterized comprising a transmission mechanism permanently
10 disposed on the frame of a talking machine; means for temporarily operatively engaging and disengaging said transmission mechanism and the driving shaft of said talking
15 machine, said means embodying a member moved in correspondence with the tone arm of said talking machine; means for operatively connecting said transmission mechanism and said tone arm for returning the
20 tone arm to its initiatory position; and means operable by said transmission mechanism for lifting a sound-box mounted on said tone arm from the record groove prior to the movement of said tone arm toward
25 the initiatory position thereof, said means embodying an elevating mechanism, comprising a lifting lever pivotally mounted on

the tone arm near the pivot center thereof, and means operatively connecting said lever and said sound-box.

19. A repeater as characterized comprising a transmission mechanism permanently
30 disposed on the frame of a talking machine; means for temporarily operatively engaging and disengaging said transmission mechanism and the driving shaft of said talking
35 machine, said means embodying a member moved in correspondence with the tone arm of said talking machine; means for operatively connecting said transmission mechanism and said tone arm for returning the
40 tone arm to its initiatory position; and means operable by said transmission mechanism for lifting a sound-box mounted on said tone arm from the record groove prior to the movement of said tone arm toward
45 the initiatory position thereof, said means embodying an elevating mechanism, and means for causing the operation of said elevating mechanism in advance of the movements of said tone arm by said transmis-
50 sion mechanism.

JOHN PARA.

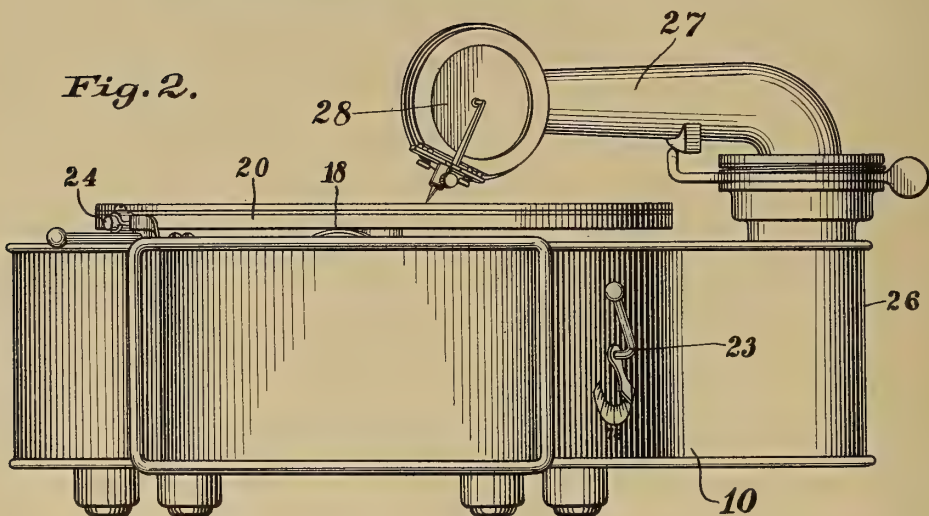
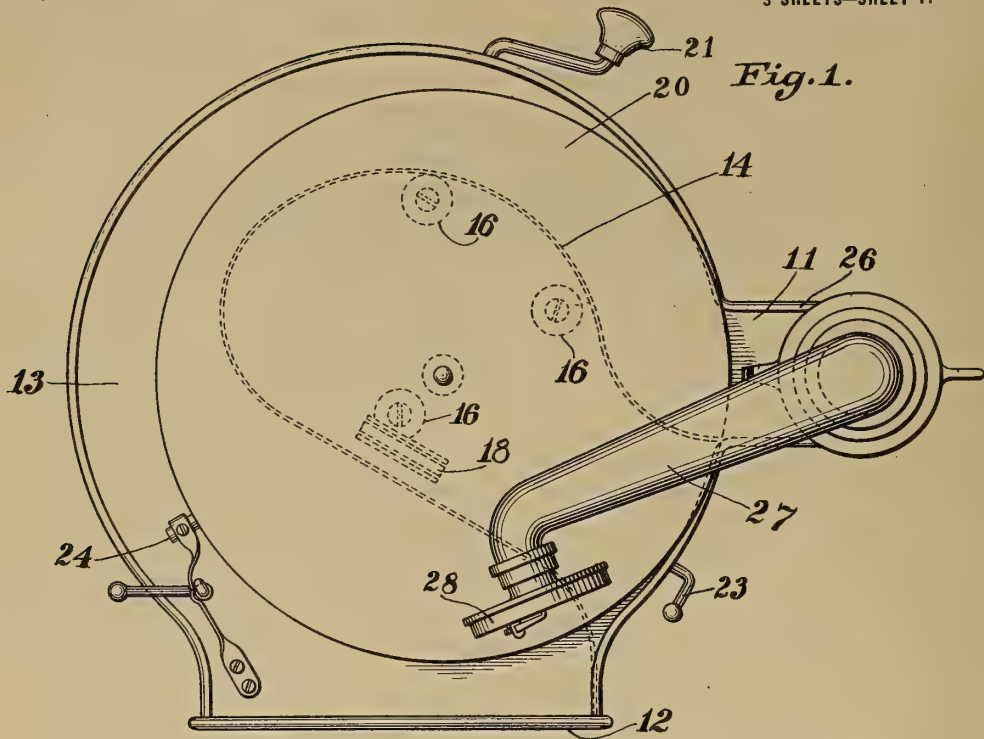
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PHONOGRAPH,
#1,219,164-----M.J.Samuels,
Patented-March 13th, 1917.
Filed-April 17th, 1915.

1,219,164.

M. J. SAMUELS.
 PHONOGRAPH.
 APPLICATION FILED APR. 17, 1915.

Patented Mar. 13, 1917.
 3 SHEETS—SHEET 1.



Inventor
 Mark Jay Samuels
 By his Attorney
 Sheffield & Betts

1,219,164.

M. J. SAMUELS.

PHONOGRAPH.

APPLICATION FILED APR. 17, 1915.

Patented Mar. 13, 1917.

3 SHEETS—SHEET 2.

Fig. 3.

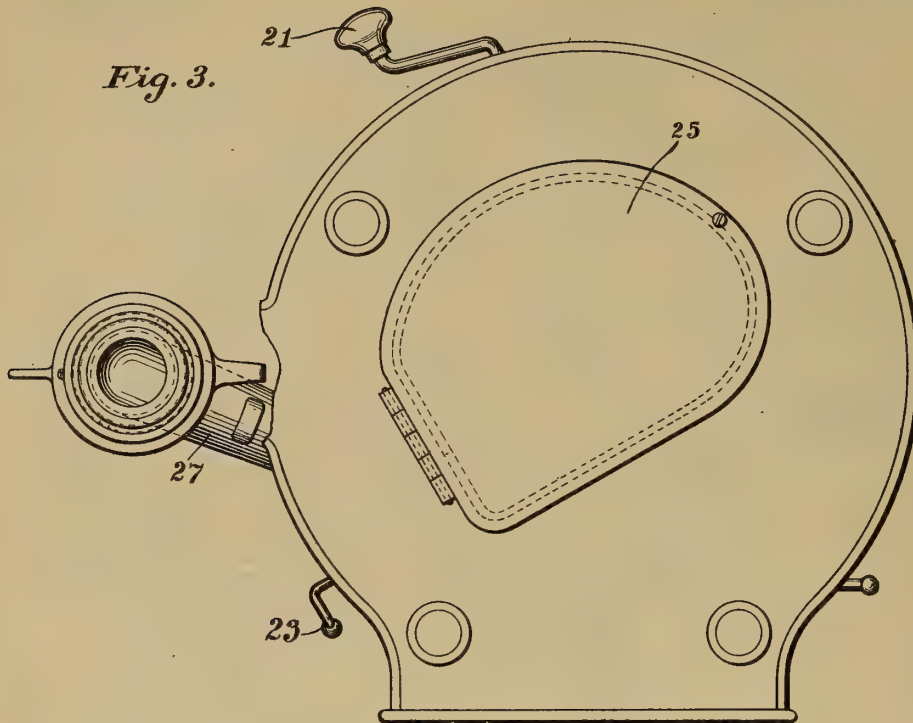
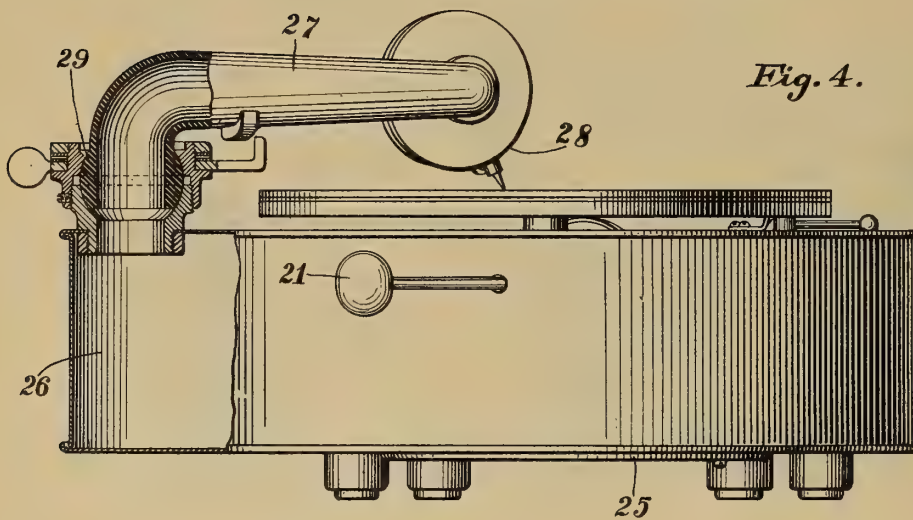


Fig. 4.



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1,219,164.

M. J. SAMUELS.
 PHONOGRAPH.
 APPLICATION FILED APR. 17, 1915.

Patented Mar. 13, 1917.
 3 SHEETS—SHEET 3.

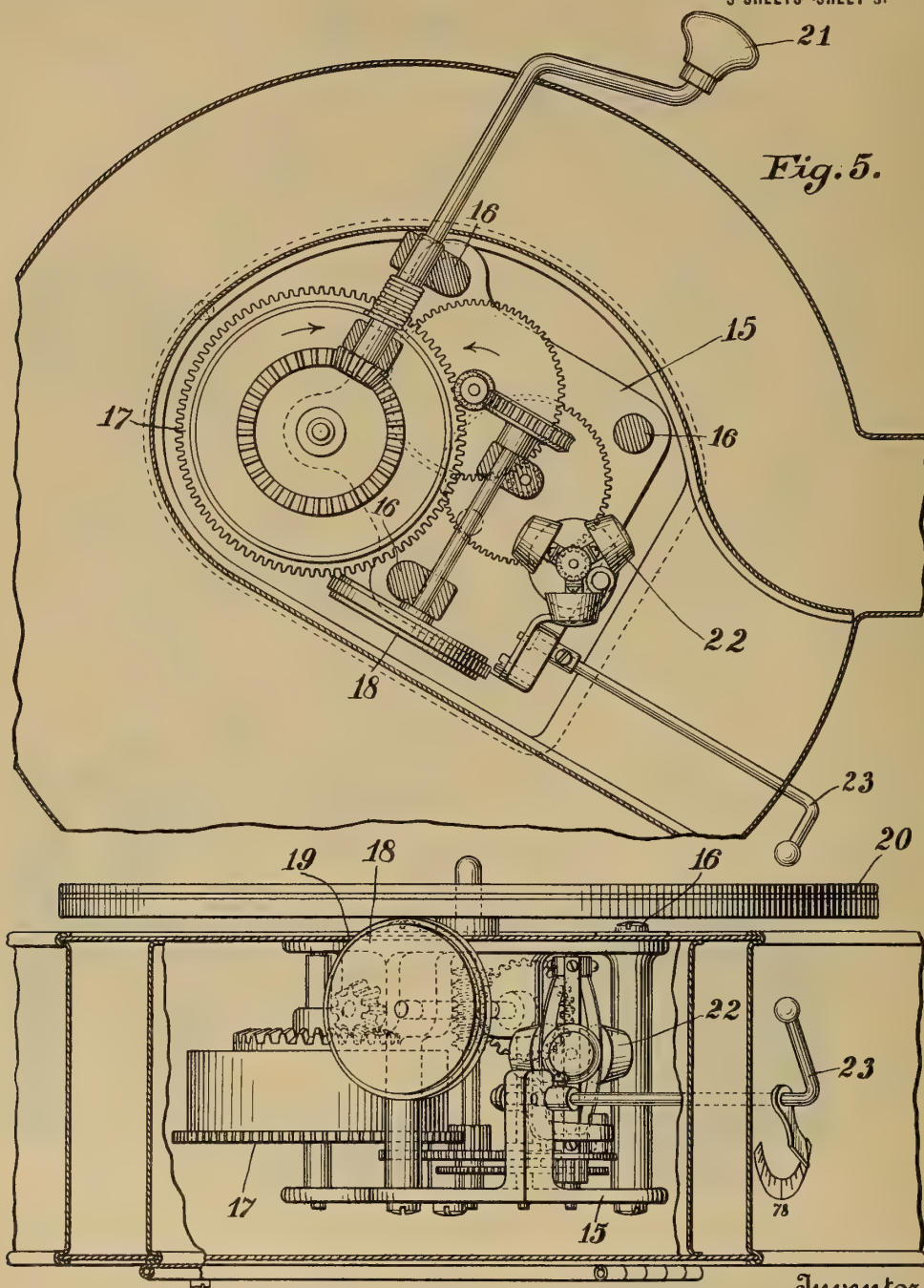


Fig. 6.

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 By his Attorneys
 Sheffield & Betts

UNITED STATES PATENT OFFICE.

MARK JAY SAMUELS, OF NEW YORK, N. Y.

PHONOGRAPH.

1,219,164.

Specification of Letters Patent. Patented Mar. 13, 1917.

Application filed April 17, 1915. Serial No. 21,983.

To all whom it may concern:

Be it known that I, MARK JAY SAMUELS, a citizen of the United States, and a resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs, and particularly to phonographs of the type which utilize disk records.

For the purpose of improving the appearance of phonographs of this type, it has recently become popular to dispense with the sound amplifying horn and to use a wooden sounding board, or sound box, situated in the support as a substitute for the horn. The results obtained by this substitution have been satisfactory to a certain degree, but great difficulty is encountered in producing a number of instruments which will give exactly the same tone quality, since it is practically impossible to obtain two pieces of wood for use as a sounding board, or sound box, which are exactly the same.

To obviate this difficulty, and for other reasons which will hereinafter appear, my invention contemplates the use of an entirely metallic sound amplifying device which takes the place of the horn heretofore used and of the sounding board, or sound box, now commonly in use, and serves also as a support for all of the remaining parts of the phonograph.

It is also an object of my invention to provide a sound amplifying device which shall be composed entirely of metal, and in which there shall be no soldered joints, since I have found that soldered joints interfere considerably with the tone reproduction.

Another object of my invention is to provide improved means, preferably supported by the sound amplifying device for driving the record supporting disk. This means consists essentially of a friction driving wheel, the periphery of which is adapted to contact with the lower surface of the record supporting disk and thus impart rotary motion thereto. The advantages of such a driv-

ing means are that the speed of the record supporting disk is rendered more constant, and also that the manufacture of a friction driving wheel is less expensive than the manufacture of the tooth gear now commonly used.

Another object of my invention is the provision of an arm for supporting the sound reproducing device, which arm is made of some material other than metal, such, for instance, as hard rubber, whereby a loose ball and socket connection between two metallic surfaces is dispensed with, thus improving the tone quality.

Another object of my invention is the provision of means for automatically raising the sound reproducer from the record on the record supporting disk when the effective part of the record has been traversed by the sound producer. With the above, and other ends in view, as will hereinafter appear, my invention consists in the apparatus, parts and combinations disclosed in the drawing and described in the specification, and more particularly pointed out in the claims which follow.

In the drawings, Figure 1 is a plan view of my improved phonograph;

Fig. 2 is a front elevation thereof;

Fig. 3 is a bottom plan view with a portion of the sound amplifying device removed;

Fig. 4 is a rear elevation, partly in section, showing the ball and socket connection between the sound amplifying device and the arm for supporting the sound reproducer;

Fig. 5 is a longitudinal sectional view showing particularly the spring motor; and

Fig. 6 is a vertical sectional view.

Referring to the drawings, 10 designates the sound amplifying device and is seen to consist of a spirally arranged member, the cross section of which increases gradually from the end 11 to the other end or mouth 12. The top cover or wall 13 of the sound amplifying device preferably extends across the entire device, including the central recess 14, in which is disposed the motor 15.

The cover 13 thus forms a convenient support for the motor 15 and, as herein shown, the motor is suspended from the cover 13, by means of suitable bolts 16, passing there-
5 through.

The motor 15 may be of any desired type, such, for instance, as a spring motor or an electric motor, the motor herein illustrated being a spring motor. The particular construction of this motor is not essential to my invention and, therefore, I will not describe it in detail. Suffice it to say that the spring drum 17 is geared in some suitable manner to the friction wheel 18, which passes
15 through the slot or opening 19 in the top cover 13 of the sound amplifying device, and contacts with the under-surface of the record supporting disk 20, which is supported in some suitable manner upon the cover 13.
20 Means, such as the handle 21, is provided for tensioning the spring drum 17. Also, it is desirable to provide a governing device, such as shown at 22, for maintaining the speed of the motor and record supporting
25 disk substantially constant during the operation thereof. Regulating means, such as indicated at 23, may also be provided for varying the speed of the record supporting disk at will. At 24 is indicated some suitable means, in the nature of a friction brake,
30 acting on the edge of the record supporting disk for starting and stopping the rotation of the disk when desired.

In Fig. 3 it is seen that the bottom of my
35 sound amplifying device is provided with a door 25 over the central recess, whereby the motor may be inserted into the recess and access thereto may be had when desired.

The sound amplifying device, as above described, is composed entirely of metal having as few joints as possible, and the necessary joints are preferably lap joints, whereby all soldering is eliminated. This is important, since I have discovered that the
45 soldering of two pieces of metal in a sound reproducing instrument materially interferes with the quality of the tone produced. Also it is seen that the sound amplifying device is constructed to provide a graduated
50 passage, thereby improving the tone quality and, at the same time, reproducing the overtones which are so often destroyed in sound reproducing devices.

At one side my sound amplifying device
55 is provided with a projection 26, adapted to form a support for the arm 27, to which the reproducer 28 is connected, and to provide a means of communication between the sound amplifying device and the arm. This
60 arm 27 is preferably supported upon the projection 26 of the sound amplifying device by means of a ball and socket joint, such as is shown at 29, in Fig. 4. I prefer to construct the arm 27 of some non-metallic

material, such, for instance, as hard rubber, 65 or some composition whereby I eliminate a loose joint between two metallic surfaces, and thus avoid any interference with the tone production.

The method of operation of my improved 70 phonograph should be apparent from the foregoing. A record having been placed on the disk 20, the brake 24 is removed from contact with the edge of the disk thus permitting the motor 15 to effect the rotation 75 thereof. The reproducer 28 is then placed in contact with the record on the disk, and the device continues to operate and produce sound until the reproducer and its supporting arm 27 have moved toward the center sufficiently to cause coöperation between the cam 30 and projection 31, and the resulting elevation of the reproducer. The rotation of the disk 20 will continue after the reproducer has been elevated, but this continued rotation is of no disadvantage. 85

As above pointed out, by eliminating wood entirely from my apparatus and by using stamped, rather than cast, metal, I am able to produce any number of instruments which will give exactly the same results, and these results are found to be far superior to those obtained from wooden instruments, because of the fact that in devices embodying my invention there are no irregularities or imperfections in the sound amplifying elements. 95

The cost of manufacturing instruments embodying my invention is reduced to a minimum, since there are no excess parts. 100 The sound amplifying device serves not only its usual function, but also serves as a support for all of the other parts of the apparatus.

While I have shown and described a particular embodiment of my invention, including a particular form of sound amplifying device, I do not wish to limit myself to this exact embodiment, since obviously many changes may be made therein without departing from the spirit of my invention. 110

What I claim is:

1. In a device of the character described, a metallic sound amplifying device arranged circularly to form a central recess and including a circular top plate which bridges said recess, a motor located in said recess and dependently supported from said plate, a record supporting disk adapted to be driven by said motor, and sound reproducing means adapted to coöperate with a record on the record supporting disk and communicating with the sound amplifying device. 115 120 125

2. In a device of the character described, a metallic sound amplifying device arranged circularly to form a central recess,

and including a circular top plate which
bridges said recess, a motor located in said
recess and dependently supported from said
plate, a record supporting disk adapted to
5 be driven by said motor, sound reproducing
means adapted to coöperate with a record
on the record supporting disk and communi-
cating with the sound amplifying device,
and a bottom plate hingedly connected to
10 said amplifier, and adapted when closed to

bridge the bottom of said recess, and when
open to permit access to said motor.

In testimony whereof I have signed this
specification in the presence of two sub-
scribing witnesses.

MARK JAY SAMUELS.

Witnesses:

ANNA MARIE WALL,
E. P. LA GAY.

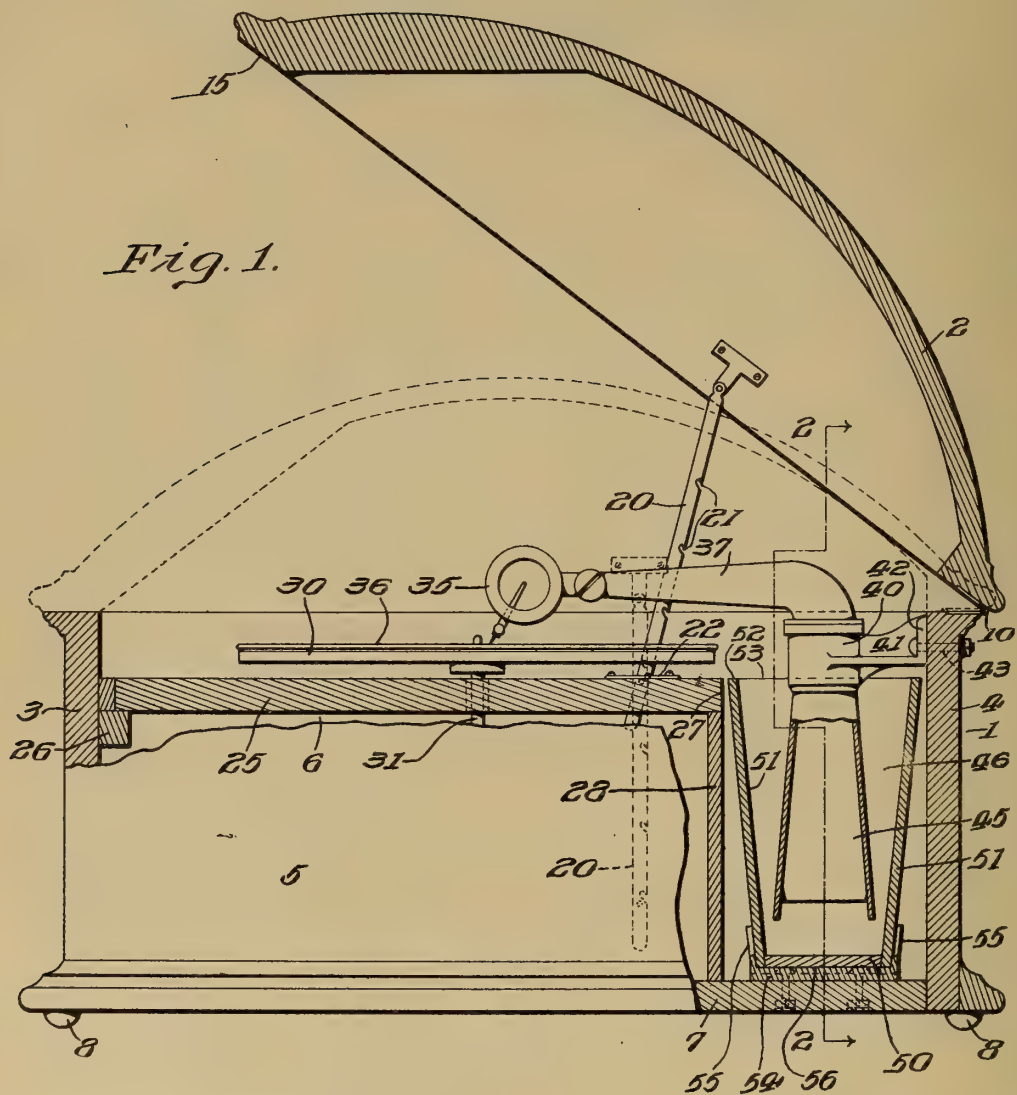
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Washington, D. C."

1,219,275.

TALKING MACHINE,
#1,219,275-----J. C. English,
Patented-March 13th, 1917.
Filed-March 24th, 1911.

1,219,275.

Fig. 1.



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John C. English.

WITNESSES
F. J. Hartmans
Alexander B. Moule

BY

1 June 1881.

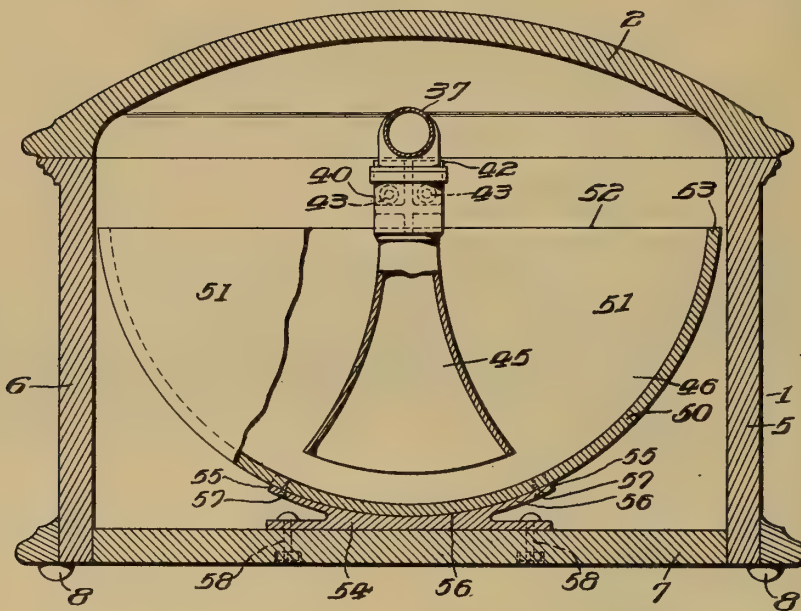
ATTORNEY

J. C. ENGLISH.
TALKING MACHINE.
APPLICATION FILED MAR. 24, 1911.

1,219,275.

Patented Mar. 13, 1917.
2 SHEETS—SHEET 2.

Fig. 2.



WITNESSES
H. J. Hartman.
Henry S. Moulton

BY

INVENTOR
John C. English
Isaac Bell
ATTORNEY

UNITED STATES PATENT OFFICE.

JOHN C. ENGLISH, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

TALKING-MACHINE.

1,219,275.

Specification of Letters Patent.

Patented Mar. 13, 1917.

Application filed March 24, 1911. Serial No. 616,666.

To all whom it may concern:

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, and a resident of the city of Camden, county of Camden, and State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

The main objects of this invention are to provide a compact efficient talking machine; to provide an improved talking machine comprising an inclosing casing having a cover adjustably arranged to deflect sound waves from the machine and having sound amplifying means arranged within the casing and opening to deliver improved sound waves upwardly toward the cover; and to provide other improvements as will appear hereinafter.

In the accompanying drawings, Figure 1 is a fragmentary side elevation, partly in vertical longitudinal section of a talking machine constructed in accordance with this invention; and Fig. 2 is a transverse section on line 2—2 of Fig. 1, looking in the direction of the arrows.

Referring to the drawings, one embodiment of this invention comprises an inclosing cabinet or casing, preferably having comparatively thick wooden walls as is usual and including a substantially rectangular body portion 1 and a cover 2 superimposed thereon.

The body 1 of the casing includes a vertical front wall 3, a vertical back wall 4 parallel to the front wall, two vertical parallel side walls 5 and 6 and a bottom wall 7. The body is preferably mounted on suitable supports 8 depending therefrom.

The cover 2 is preferably connected at its rear edge to the upper edge of the rear wall 4 of the body of the casing by hinges 10 and is preferably exteriorly convex and curved, and interiorly concave in form. The cover is preferably proportioned and arranged to extend over the entire upper end of the body 4 when the cover is closed, the cover having a flat rectangular marginal wall 15, which when closed, rests against the flat upper edges of the vertical exterior walls of the body. The major portion of the inner surface of the cover is curved longitudinally and transversely, but the front portion of the inner surface is preferably substantially flat and has an inclination of substantially

45° to the plane of the lower margin of the cover.

For holding the cover 2 adjustably in position with respect to the body 1 of the casing there is provided any suitable means between the cover and the body, for instance, a link 20 pivotally connected at one end to the underside of the cover and provided with notches 21 spaced longitudinally in one edge thereof, the link being arranged to engage a pin or stop 22 secured within the body of the casing and adapted to engage in the notches.

Inclosed by the body 1 of the casing and spaced below the top thereof is an upwardly removable horizontal substantially rectangular partition 25. The front edge of this partition rests upon a cleat 26 secured against the inner surface of the front wall 3, and the rear edge 27 of this partition is parallel to and spaced forwardly from the back wall 4 of the casing and rests upon the upper edge of a vertical rectangular partition 28 parallel to the back wall and the lower edge of which rests upon and is secured to the bottom 7 of the casing.

Within the body 1 of the casing, below the top thereof and above the horizontal partition 25, is the usual or any suitable horizontal turn-table 30 which is rotatably mounted upon the upper end of a spindle 31 projecting downwardly and rotatably through the partition 25. The spindle 31 is rotated by the usual or any suitable actuating mechanism (not shown) arranged within the casing beneath the horizontal partition 25 and preferably depending therefrom in a well known manner. The horizontal partition 25 and vertical partition 28 cooperate with the front wall 3, side walls 5 and 6 and bottom wall 7 to form a compartment entirely inclosing the actuating mechanism.

Above the turn-table 30 and inclosed by the casing 1, is the usual or any suitable sound box or sound reproducer 35 which is arranged to cooperate with a sound record 36 upon the turn-table 30. The sound box 35 is connected in any well known or suitable manner with the free smaller end of a tapering hollow tone arm 37 which extends rearwardly therefrom with which it communicates.

For supporting the tone arm 37 to swing in a fixed substantially horizontal plane, the larger end of the tone arm is turned longitudinally downwardly through an arc of

about 90° and is mounted in any well known or suitable manner to oscillate about a fixed vertical axis upon the upper end of and co-axially with a hollow vertical substantially cylindrical tubular sleeve or bracket 40, preferably made of cast iron or other similar material.

This bracket 40 is secured in a fixed position with respect to the body 1 of the casing by any suitable means; for instance, the bracket may be provided with a lateral extension 41 projecting rearwardly therefrom integral therewith or rigidly secured thereto and terminating in a vertical base plate 42 which is rigidly clamped to the inner surface of the rear wall 4 adjacent the upper edge thereof by means of bolts 43 extending through the base plate 42 and wall 4.

The bracket 40 is preferably arranged with its longitudinal vertical axis substantially midway between the inner surface of the back wall 4 and the opposite surface of the vertical partition 28 and substantially midway between the side walls 5 and 6 of the casing.

For amplifying the sound waves transmitted from the tone arm downwardly through the bracket 40, there depends downwardly from the bracket a downwardly flaring sound conveyer or hollow intermediate amplifying means 45 having a substantially vertical longitudinal axis coincident with the longitudinal axis of the cylindrical portion of the bracket 40.

The downwardly flaring sound conveyer 45 is preferably rigidly connected to the bracket 40 and may be made integral therewith of cast iron or other suitable metal and is preferably substantially circular exteriorly and interiorly at its upper smaller end where it joins the cylindrical portion of the bracket 40 and preferably gradually changes in transverse section exteriorly and interiorly from the circular shape of its upper end to an oblong substantially rectangular shape at its lower or delivery end, the major axis of the delivery end being substantially parallel to the back wall 4 of the casing and the edges of the delivery end being substantially flat and horizontal and spaced above the upper surface of the bottom 7 of the casing.

For the amplification of the sound waves after having been delivered by the intermediate amplifying means 45, there is interposed between the lower delivery end of the intermediate amplifying means 45 and the bottom 7 of the casing, hollow amplifying means 46 surrounding but spaced from the intermediate amplifying means 45 and arranged upon a longitudinal axis coincident with the longitudinal axis of the intermediate amplifying means and diverging upwardly and terminating in an up-

wardly opening delivery end in a plane substantially flush with the top surface of the horizontal partition 25.

This upwardly diverging amplifying means 46 includes a hollow body or major portion comprising an exteriorly convex and interiorly concave support 50, preferably consisting of a comparatively thick board, curved longitudinally and the longitudinal axis of which is arranged in a vertical plane. The longitudinal edges of this board converge from the ends of the board toward the lower central portion of the board.

A flat comparatively thin substantially semi-circular sounding board 51 is marginally secured to each longitudinal edge of this support 50. The curved edge of each of these sounding boards preferably overlaps or abuts against the corresponding edge of the support and is fixedly secured thereto by any suitable means.

These two sounding boards 51 form the opposite sides of this amplifying means and diverge upwardly, the upper straight edges 52 of these boards being in a horizontal plane with the end edges 53 of the support. The sounding boards 51 and their connecting support, forming the body portion of this upwardly opening amplifying means 46 are mounted in a base plate 54, the upper portion of which is provided with oppositely disposed flanged lateral extensions 55 forming a longitudinally curved concave socket 56 in which the lower portions of the boards 51 and the support 50 fit snugly and are rigidly secured by means of screws 57 passing through the extensions 55 and into the support 50. This base plate 54 is provided with a flat horizontal under-surface which is clamped rigidly against the upper surface of the bottom 7 of the casing by means of bolts 58 or in any other suitable manner. The base plate 54 forms the sole support for the amplifying means carried thereby and which projects freely therefrom.

The upper delivery end of the hollow amplifying means carried by the base plate 54 is preferably substantially rectangular and oblong in shape and is arranged with its major axis substantially horizontal and parallel with the back wall 4 of the casing. This delivery end is preferably proportioned to occupy substantially the full space between the side walls 5 and 6 of the casing and between the vertical partition 28 and the back wall 4 of the casing, but is free from these walls, a substantially rectangular restricted but uninterrupted passage being left between this delivery end and the adjacent walls.

In the operation of this device, it is evident that the sound waves from the reproducer 35 are transmitted and slightly am-

plified by the tapering tone arm 37, are then transmitted and further amplified by the downwardly flaring conveyer 45 which delivers the sound waves into the upwardly opening amplifying means 46, where a further amplification takes place and from the delivery end of which the sound waves are transmitted upwardly toward and against the inner concave surface of the cover 2 from which the sound waves are deflected forwardly from the casing, the cover also acting to increase the amplification of the sound waves.

Although only a single form has been illustrated in which this invention may be embodied, the invention obviously is not limited to any particular form but may be applied in various constructions without departing from the spirit of the invention or the scope of the appended claims.

Having thus described my invention, what I claim and desire to protect by Letters Patent of the United States, is:

1. In a talking machine, the combination with a casing, of a sound reproducer, a hollow sound conveyer communicating with said reproducer and having a downwardly opening delivery end terminating within said casing, and hollow sound amplifying means arranged within said casing and opposed to and having an outlet surrounding said delivery end, to reverse the direction of sound waves issuing from said delivery end said casing being provided with an angularly adjustable cover arranged to deflect sound waves after delivery by said sound amplifying means.

2. In a talking machine, the combination with sound reproducing means, of a hollow sound conveyer communicating with said means and terminating in a longitudinally straight free delivery end, and hollow sound amplifying means coaxial with the longitudinal axis of said delivery end and opposed thereto, said amplifying means comprising a longitudinally curved support, and a pair of spaced sounding-boards secured to said support and upon opposite sides of said delivery end respectively providing a sound outlet surrounding said delivery end.

3. In a talking machine, the combination with a casing, of a sound reproducer, a hollow sound conveyer communicating with said reproducer and having a delivery end opening downwardly within said casing, and means arranged within said casing and opposed to and having an upwardly facing outlet surrounding said delivery end, to deflect sound waves upwardly from said delivery end, said casing being provided with a cover adjustable to deflect sound waves transmitted by said delivery end.

4. In a talking machine, the combination with a casing, of a sound reproducer, a hol-

low sound conveyer communicating therewith and inclosed by said casing, said sound conveyer having a delivery end projecting and opening downwardly within said casing, and hollow sound amplifying means including spaced sounding boards inclosed by said casing and surrounding and opposed to said delivery end, and arranged to reverse the direction of sound waves issuing from said delivery end.

5. In a talking machine, the combination with a casing, of means forming a compartment in the front and lower portion of said casing, a rotary record turn-table inclosed by said casing above said compartment, actuating means for said turn-table arranged within said compartment, a sound reproducer arranged within said casing above said turn-table, a hollow sound conveyer communicating with said sound reproducer and having a downwardly facing open delivery end terminating within said casing and below the upper plane of said compartment, hollow sound amplifying means opening upwardly within said casing outside of said compartment and coaxial with and opposed to and surrounding said delivery end and adjustable means adjacent the discharge opening of said amplifying means to direct the sound laterally therefrom.

6. In a talking machine, the combination with a casing, of a sound reproducer inclosed thereby, a hollow sound conveyer communicating with said reproducer and terminating in an open delivery end facing downwardly in said casing, and hollow sound amplifying means within said casing and having an upwardly facing outlet in alignment with said delivery end and opposed thereto, said casing being provided with an angularly adjustable cover arranged to deflect sound waves transmitted thereto from the outlet of said amplifier.

7. In a talking machine, the combination with a casing, of a sound reproducer inclosed thereby, a hollow sound conveyer communicating with said reproducer and terminating in a freely projecting downwardly opening delivery end, transversely oblong in cross section, hollow sound amplifying means within said casing and opposed to said delivery end, said sound amplifying means surrounding the downwardly extending delivery end of said conveyer and having a transversely oblong upwardly opening delivery end and adjustable means adjacent the delivery end of said amplifying means to deflect the sound laterally therefrom.

8. In a talking machine, the combination with a casing, of a sound reproducer inclosed thereby, a hollow sound conveyer communicating with said reproducer and terminating in a freely projecting downwardly opening delivery end fixedly secured to said cas-

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ing, said delivery end being transversely oblong in cross section, hollow sound amplifying means within said casing and fixedly secured thereto and opposed to said delivery end, said sound amplifying means having an oblong delivery end extending substantially the full distance between the inner surfaces of two opposite exterior walls of said casing and adjustable means extending lengthwise of the delivery end of said amplifying means and adjacent thereto to direct the sound laterally from said amplifying means.

9. In a talking machine, the combination of a casing, an amplifier oblong in transverse cross section arranged in said casing to discharge sound upwardly and arranged across said casing adjacent a vertical wall thereof, a hollow sound conveyer having a delivery end oblong in cross section extending downwardly into said amplifier to a position near the bottom of said amplifier, a cover hinged to a top edge of a wall of said casing to intercept sound waves delivered from said sound amplifier when said cover is raised, and to deflect said sound waves laterally, and means to hold said cover in different adjustable positions.

10. In a talking machine, the combination of a casing, an amplifier increasing in cross section longitudinally arranged transversely

in said casing adjacent the rear wall thereof to discharge sound upwardly, a hollow sound conveyer having a delivery end increasing in cross sectional area extending downwardly into said amplifier to a point near the bottom thereof, and a cover hinged to the rear wall of said casing to deflect the sound delivered from said amplifier laterally across the top of said casing.

11. In a talking machine, the combination of a casing, a flattened amplifier within said casing disposed transversely thereto and having its outlet at the top of said casing, a hollow sound conveyer having its delivery end flattened, constantly increasing in cross sectional area and extending downwardly into said amplifier, a cover hinged to a wall of said casing parallel to the longer dimension of the outlet of said amplifier, and means to hold said cover at different angles with respect to the outlet of said amplifier to deflect the sound waves delivered thereto from said amplifier in different directions.

In witness whereof, I have hereunto set my hand this 17th day of March, A. D. 1911.

JOHN C. ENGLISH.

Witnesses:

FRANK B. MIDDLETON, Jr.,
CHARLES F. WILLARD.

WINDING DEVICE FOR SPRING
MOTORS,

#1,219,325-----J.W.Jones,
Patented-March 13th, 1917.
Filed-December 2nd, 1915.

J. W. JONES.
WINDING DEVICE FOR SPRING MOTORS.
APPLICATION FILED DEC. 2, 1915.

1,219,325.

Patented Mar. 13, 1917.

Fig. 1.

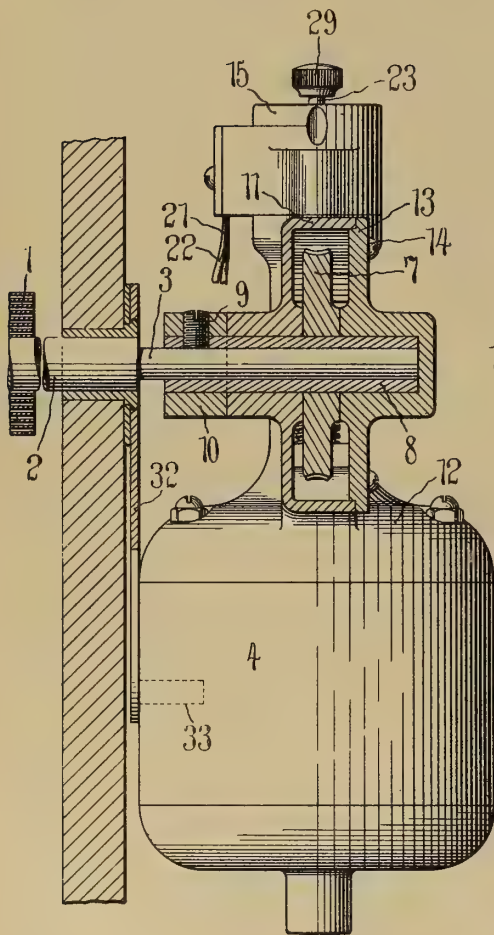


Fig. 2.

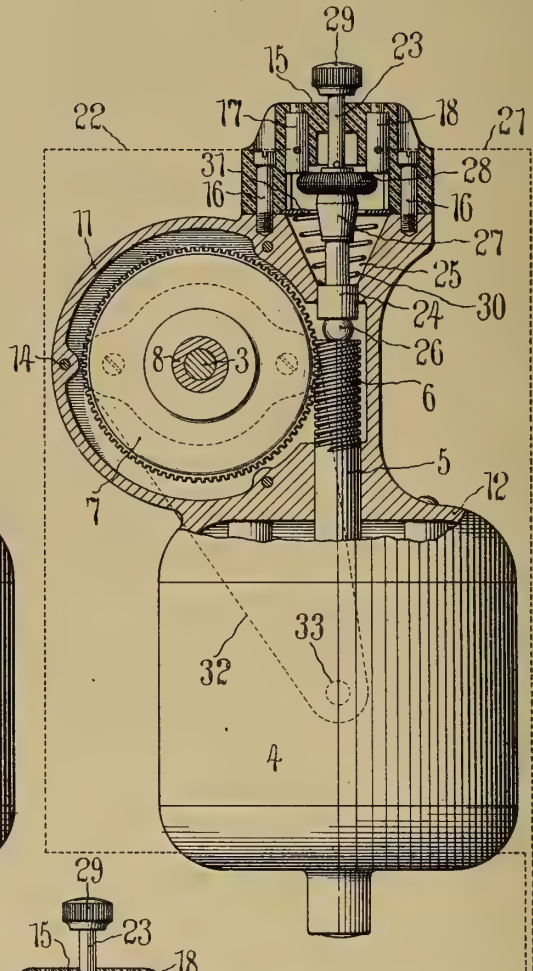
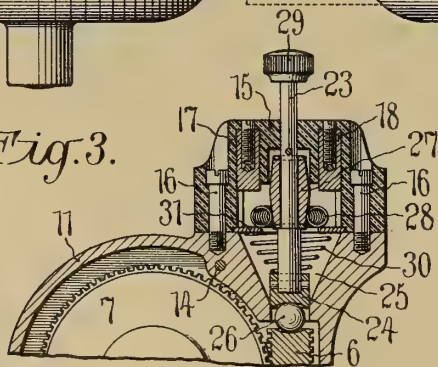


Fig. 3.



Witness:
Harry E. Fleischel

Inventor:
Joseph W. Jones
by attorneys
Mowatt, Seward

UNITED STATES PATENT OFFICE.

JOSEPH W. JONES, OF PELHAM, NEW YORK, ASSIGNOR TO JONES MOTROLA, INC., OF
NEW YORK, N. Y., A CORPORATION OF NEW YORK.

WINDING DEVICE FOR SPRING-MOTORS.

1,219,325.

Specification of Letters Patent.

Patented Mar. 13, 1917.

Application filed December 2, 1915. Serial No. 64,721.

To all whom it may concern:

Be it known that I, JOSEPH W. JONES, a citizen of the United States, and resident of Pelham, in the county of Westchester and State of New York, have invented a new and useful Improvement in Winding Devices for Spring-Motors, of which the following is a specification.

This invention is directed to means for maintaining a spring-motor under operative tension at all times.

The invention includes a prime motor and means for connecting it with the spring-motor, comprising a movable element such as a longitudinally movable rotary shaft, whose movement is accomplished by pressure exerted thereon by the varying resistance of the spring-motor spring due to the winding and unwinding thereof for stopping and starting the prime motor.

The invention more particularly includes an electric motor and its controlling switch, said switch being opened and closed by the longitudinal movement of the rotary armature shaft, which shaft has a winding connection with the spring-motor, endwise pressure exerted by the tendency of the spring-motor spring to unwind being imparted to the armature shaft for moving it in a direction to open the switch for stopping the electric motor when the spring-motor spring has been wound up to a predetermined degree of tension and other pressure means, such as a spring, being employed for moving the armature shaft in the opposite direction to close the switch for starting the electric motor when the spring-motor spring has been unwound to a predetermined degree of tension; the movement of the shaft being accomplished by the overbalancing of the pressure of either one of the two shaft moving means due to the varying resistance of the spring-motor spring as it is wound and unwound between said predetermined degrees of tension.

A practical embodiment of my invention is represented in the accompanying drawings, in which,

Figure 1 is a view of the winding device shown partly in elevation and partly in section.

Fig. 2 is a similar view taken at right an-

gles to Fig. 1, the motor controlling switch being shown in its closed position, and

Fig. 3 is a detail section showing the switch thrown to its open position.

A portion of the spring 1 of a spring-motor is shown in Fig. 1 and its winding shaft is denoted by 2, from which shaft an extension shaft 3 projects.

The winding device includes a prime motor adapted for winding connection with the spring-motor.

In the present embodiment of my invention, the prime motor is shown as an electric motor 4 having a longitudinally movable rotary armature shaft 5 slidably and rotatably mounted in suitable bearings, it being understood that the commutator ring and brushes, not shown, shall be so arranged as to be kept in contact throughout the longitudinal movement of the armature shaft. This armature shaft has a winding connection with the spring-motor spring, in the present instance through a worm 6 on the armature shaft and its worm gear 7 on a sleeve 8 surrounding the extension shaft 3 of the spring-motor, which sleeve is secured to the extension shaft by a set screw 9 passing through a collar 10 on the inner end of the sleeve and through the sleeve into binding engagement with said shaft.

A housing 11 is provided for the gears, which housing includes the top 12 of the motor casing and the removable cover 13 held in position over the worm gear 7 by suitable fastening screws 14.

A controlling switch for the electric motor is provided, which switch may be of any well known or approved form. This switch is mounted on the housing 11 and comprises an insulating base 15 secured by screws 16 to the housing, said base having two circuit contact pieces 17 and 18, electrically connected to the circuit wires 21, 22, the circuit wire 22 leading through the electric motor, as indicated diagrammatically in Fig. 2.

The longitudinally movable plunger 23 of the switch is arranged in alinement with the armature shaft 5 and it has an enlarged inner end 24 slidably mounted in the reduced bore of a recess 25 in the housing 11.

For anti-friction purposes, a ball 26 may be interposed between the adjacent ends of

the armature shaft and switch plunger. This plunger is also provided with a double conical enlargement 27 surrounded by a yielding contact ring 28 arranged to be
 5 snapped into and out of engagement with the contact pieces 17, 18, to close and open the circuit for starting and stopping the motor as the plunger nears the limits of its inward and outward movements, respec-
 10 tively.

The outer end of the plunger 23 is provided with a push-button 29 serving as a manual means for moving the plunger inwardly to close the circuit for starting the
 15 motor at pleasure.

The tendency of the spring-motor spring to unwind exerts an endwise pressure on the armature shaft 5 through the worm gear 7 and worm 6 tending to move the shaft longi-
 20 tudinally in a direction to open the switch through the plunger 23, which pressure varies as the resistance of the spring-motor spring varies. An automatic means is provided for starting the motor, which means
 25 exerts an endwise pressure in the opposite direction on the armature shaft 5, through the plunger 23, to close the switch and to move the armature shaft against the pressure exerted by the resistance of the spring-
 30 motor spring.

This pressure means is shown as a coil spring 30 seated in the recess 25 of the housing 11 between the enlarged inner end 24 of the plunger and a plate 31 held in place
 35 at the mouth of the recess by the insulating base 15 of the switch. This plate 31 serves to limit the movement of the spring ring 28 of the switch away from the contact pieces 17, 18.

The tension of the spring 30 is made so that it will overcome the pressure exerted by the resistance of the spring-motor spring when said spring-motor spring tension is reduced to a predetermined degree by the
 45 unwinding thereof, and will, in turn, be overcome by the pressure exerted by the resistance of the spring-motor spring when the spring-motor spring has been wound to a predetermined degree.

The operation of the device is as follows: Assuming the spring-motor spring has been unwound to a predetermined low tension and that the switch has been closed by the pressure exerted by the spring 30, and the
 55 armature shaft moved longitudinally, to the limit of its movement in one direction, the rotary movement of the armature shaft due to the operation of the electric motor will wind the spring-motor spring through the gear up to a point where the endwise pressure on the armature shaft, due to the increased tension of the spring-motor spring, will move the armature shaft longitudinally against the pressure exerted by the spring 30 into position to open the switch

through the plunger 23 and ring 28. This will automatically cause the electric motor to stop and thereby cease winding the spring-motor spring. When the spring-motor spring has been unwound to a point
 70 where its endwise pressure on the armature shaft is less than the pressure of the spring 30, the spring 30 will move the plunger and thereby the armature shaft in the opposite direction and close the switch to
 75 again start the motor.

From the above description it will be seen that the winding device is under the control of the pressure exerted by the varying resistance of the spring-motor spring and is operated by an overbalancing of pressure thereon to maintain the tension of the spring-motor spring within predetermined limits, irrespective of the number of rotations of the spring-motor winding shaft. This
 85 winding device will, therefore, always maintain the spring between the desired degrees of tension irrespective of the weakening of the spring due to long continued use, the device, as above indicated, not being controlled by the number of revolutions of the spring-motor winding shaft.

It is obvious that this device may be utilized in connection with spring-motors of any character wherever it is desirable to
 95 automatically maintain the spring between predetermined degrees of tension.

It is also seen that I have provided manual means for starting the motor at any time irrespective of the tension of the spring-motor spring, said means not interfering in
 100 any degree with the operation of the device for automatically controlling the tension of the spring.

Means are employed for securely holding the winding device to its support against turning on the spring-motor winding shaft due to the torque of the spring-motor spring, such means for instance, being a
 105 plate 32, fixed to the support around the shaft 3 and having a pin 33 engaging a hole in the housing, preferably but not necessarily, holding the device vertically with respect to its support.

Features of my invention shown and described but not claimed herein are covered in my co-pending application filed January
 115 26, 1915, Serial No. 4551.

It is evident that many changes may be resorted to in the form, construction and arrangement of the several parts without departing from the spirit and scope of my invention; hence I do not wish to limit myself to the structure herein set forth, but
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What I claim is:

1. A winding device for spring-motors including a prime motor, means operated by the resistance of the spring-motor spring to stop the prime motor, and manual means for starting the prime motor.
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2. A winding device for spring-motors including an electric motor, means operated by the resistance of the spring-motor spring to stop the electric motor, and manual means for starting the electric motor.
3. A winding device for spring-motors including a switch, an electric motor, the switch being opened by the resistance of the spring-motor spring to stop the electric motor, and manual means for closing the switch for starting the electric motor.
4. A winding device for spring-motors including a prime motor, means for connecting it to the spring-motor comprising an element moved by the resistance of the spring-motor spring to stop the prime motor, and manual means to move said element to start the prime motor.
5. A winding device for spring-motors including a prime motor, means for connecting it to the spring-motor comprising an element moved by the resistance of the spring-motor spring, and both automatic and manual means to move said element to start the prime motor.
6. A winding device for spring-motors including a switch, an electric motor, means for connecting it to the spring-motor comprising an element moved by the resistance of the spring-motor spring to open the switch for stopping the electric motor, and manual means to move said element and close the switch for starting the electric motor.
7. A winding device for spring-motors including a switch, an electric motor, means for connecting it to the spring-motor comprising an element moved by the resistance of the spring-motor spring to open the switch for stopping the electric motor, and both automatic and manual means to move said element and close the switch for starting the electric motor.
8. A winding device for spring-motors including a prime motor, automatic means controlled by the varying resistance of the spring-motor spring to start and stop the prime motor and manual means to start the prime motor.
9. A winding device for spring-motors including a switch, an electric motor, automatic means controlled by the varying resistance of the spring-motor spring for opening and closing the switch to stop and start the electric motor and manual means for closing the switch to start the motor.
10. A winding device for spring-motors including a prime motor, means for connecting it to the spring motor comprising a movable element whose movement is controlled by the varying resistance of the spring-motor spring to start and stop the prime motor, and manual means for starting the prime motor.
11. A winding device for spring-motors including a switch, an electric motor, means for connecting it to the spring-motor comprising a movable element whose movement is controlled by the varying resistance of the spring-motor spring for opening and closing the switch to stop and start the electric motor, and manual means to close the switch for starting the said electric motor.
12. A winding device for spring-motors including a prime motor, means for connecting it to the spring-motor comprising a movable element whose movement is controlled by the varying resistance of the spring-motor spring to start and stop the prime motor, and manual means to move said element and start the prime motor.
13. A winding device for spring-motors including a switch, an electric motor, means for connecting it to the spring-motor comprising a movable element whose movement is controlled by the varying resistance of the spring-motor spring for opening and closing the switch to stop and start the electric motor, and manual means to move said element and close the switch for starting said electric motor.
14. A winding device for spring-motors including a prime motor, means for connecting it to the spring-motor comprising a longitudinally movable rotary shaft whose longitudinal movement is controlled by the varying resistance of the spring-motor spring to start and stop the prime motor, and manual means to move said shaft and start the prime motor.
15. A winding device for spring-motors including a switch, an electric motor, means for connecting it to the spring-motor comprising a longitudinally movable rotary shaft whose longitudinal movement is controlled by the varying resistance of the spring-motor spring for opening and closing the switch to stop and start the electric motor, and manual means to move said shaft and close the switch for starting said electric motor.
16. A winding device for spring-motors including an electric motor, means for connecting it to the spring-motor comprising the longitudinally movable rotary armature shaft moved longitudinally by the resistance of the spring-motor spring to stop the electric motor, and manual means to start the electric motor.
17. A winding device for spring-motors including an electric motor, means for connecting it to the spring-motor, comprising the longitudinally movable rotary armature shaft moved longitudinally by the resistance of the spring-motor spring to stop the electric motor, and manual and automatic means to start the electric motor.
18. A winding device for spring-motors including an electric motor, means for connecting it to the spring-motor comprising the longitudinally movable rotary armature

shaft whose longitudinal movements to stop and start the electric motor are accomplished by the increasing and decreasing endwise pressure on the shaft due to the increase and decrease in the spring-motor spring tension, and manual means to start the electric motor.

19. A winding device for spring-motors including a switch, an electric motor, means for connecting it to the spring-motor comprising the longitudinally movable rotary armature shaft whose longitudinal movement to open the switch for stopping the motor is accomplished by the increasing endwise pressure on the shaft due to the increase in the spring-motor spring tension.

20. A winding device for spring-motors including a switch, an electric motor, means for connecting it to the spring-motor comprising the longitudinally movable rotary armature shaft whose longitudinal movement to open the switch for stopping the motor is accomplished by the increasing endwise pressure on the shaft due to the increase in the spring-motor spring tension, and automatic means to close the switch for starting the electric motor.

21. A winding device for spring-motors including a switch, an electric motor, means for connecting it to the spring-motor comprising the longitudinally movable rotary armature shaft whose longitudinal movement to open the switch for stopping the motor is accomplished by the increasing endwise pressure on the shaft due to the increase in the spring-motor spring tension, and manual means to close the switch for starting the electric motor.

22. A winding device for spring motors including a switch, an electric motor, means for connecting it to the spring-motor comprising the longitudinally movable rotary armature shaft whose longitudinal movement to close the switch for starting the electric motor is accomplished by the decreasing endwise pressure on the shaft due to the decrease in the spring-motor spring tension.

23. A winding device for spring-motors including a switch, an electric motor, means for connecting it to the spring-motor comprising the longitudinally movable rotary armature shaft whose longitudinal movement to close the switch for starting the electric motor is accomplished by the decreasing endwise pressure on the shaft due to the decrease in the spring-motor spring tension, and automatic means to open the switch for stopping the electric motor.

24. A winding device for spring-motors including a switch, an electric motor, means for connecting it to the spring-motor comprising the longitudinally movable rotary armature shaft whose longitudinal movements to open and close the switch for stop-

ping and starting the electric motor are accomplished by the increasing and decreasing endwise pressure on the shaft due to the increase and decrease in spring-motor spring tension.

25. A winding device for spring-motors including a switch, an electric motor, means for connecting it to the spring-motor comprising the longitudinally movable rotary armature shaft whose longitudinal movements to open and close the switch for stopping and starting the electric motor are accomplished by the increasing and decreasing endwise pressure on the shaft due to the increase and decrease in the spring-motor spring tension, and manual means to close the switch for starting the electric motor.

26. A winding device for spring-motors including a switch, an electric motor, means for connecting it to the spring-motor comprising the longitudinally movable rotary armature shaft whose movement in one direction is accomplished by an increase in pressure thereon due to an increased tension of the spring-motor spring to open the switch for stopping the electric motor and means for moving the armature shaft in the opposite direction when the tension of the spring-motor spring is reduced and close the switch for starting the electric motor.

27. A winding device for spring-motors including a switch, an electric motor, means for connecting it to the spring-motor comprising the longitudinally movable rotary armature shaft whose movement in one direction is accomplished by an increase in pressure thereon due to an increased tension of the spring-motor spring to open the switch for stopping the electric motor and means for moving the armature shaft in the opposite direction when the tension of the spring-motor spring is reduced and close the switch for starting the electric motor, and manual means for closing the switch to start the electric motor.

28. A winding device for spring-motors including a switch, an electric motor, means for connecting it to the spring-motor comprising the longitudinally movable rotary armature shaft, said spring-motor spring serving as a means to move the shaft in one direction for opening the switch to stop the electric motor and means to move the shaft in the other direction and close the switch to start the electric motor, the movement of the shaft being accomplished by an overbalancing in pressure due to the varying tension of the spring-motor spring.

29. A winding device for spring-motors including a switch, an electric motor, means for connecting it to the spring-motor comprising the longitudinally movable rotary armature shaft, said spring-motor spring serving as a means to move the shaft in one direction for opening the switch to stop the

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electric motor and means to move the shaft in the other direction and close the switch to start the electric motor, the movement of the shaft being accomplished by an over-
 5 balancing in pressure due to the varying tension of the spring-motor spring, and manual means for closing the switch to start the motor.

30. The combination with a suitable support and a spring motor winding shaft extending therethrough, of a winding device having its housing pivotally supported on said shaft and means for preventing the housing from turning on said shaft.

15 31. The combination with a suitable support and a spring-motor winding shaft extending therethrough, of a winding device having its housing pivotally supported on said shaft, and means connecting the support with the housing for preventing the housing from turning on said shaft.

20 32. The combination with a suitable support and a spring-motor winding shaft extending therethrough, of a winding device having its housing pivotally supported on said shaft, and means connecting the support with the housing for preventing the housing from turning on said shaft, the said means comprising a plate secured to the support and having an interlocked engagement with said housing.

25 33. The combination with a suitable support and a spring-motor winding shaft extending therethrough, of a winding device having its housing pivotally supported on said shaft, and means connecting the support with the housing for preventing the housing from turning on said shaft, said means comprising a plate secured to the support and having a pin entering said housing for interlocking the plate and housing.

34. A winding device for spring motors

including a switch, an electric motor, means for connecting it to the spring motor comprising a longitudinally movable rotary armature shaft, said shaft being moved longitudinally in one direction by an increased resistance of the spring-motor spring to open the switch to stop the motor and automatic means to return the shaft to its original position and to close the switch to start the electric motor when the tension of the spring-motor spring is reduced.

35. A winding device for spring motors including a switch, an electric motor, means for connecting it to the spring motor comprising a longitudinally movable rotary armature shaft, said shaft being moved longitudinally in one direction by an increased resistance of the spring-motor spring to open the switch to stop the motor and a common means acting on the switch and shaft to return the shaft to its original position and to close the switch to start the electric motor when the tension of the spring-motor spring is reduced.

36. A winding device for spring motors including a switch, an electric motor, means for connecting it to the spring motor comprising a longitudinally movable rotary armature shaft, said shaft being moved longitudinally in one direction by an increased resistance of the spring-motor spring to open the switch to stop the motor and a spring acting on the switch and shaft to return the shaft to its original position and to close the switch to start the electric motor when the tension of the spring-motor spring is reduced.

In testimony, that I claim the foregoing as my invention, I have signed my name this 30th day of November, 1915.

JOSEPH W. JONES.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

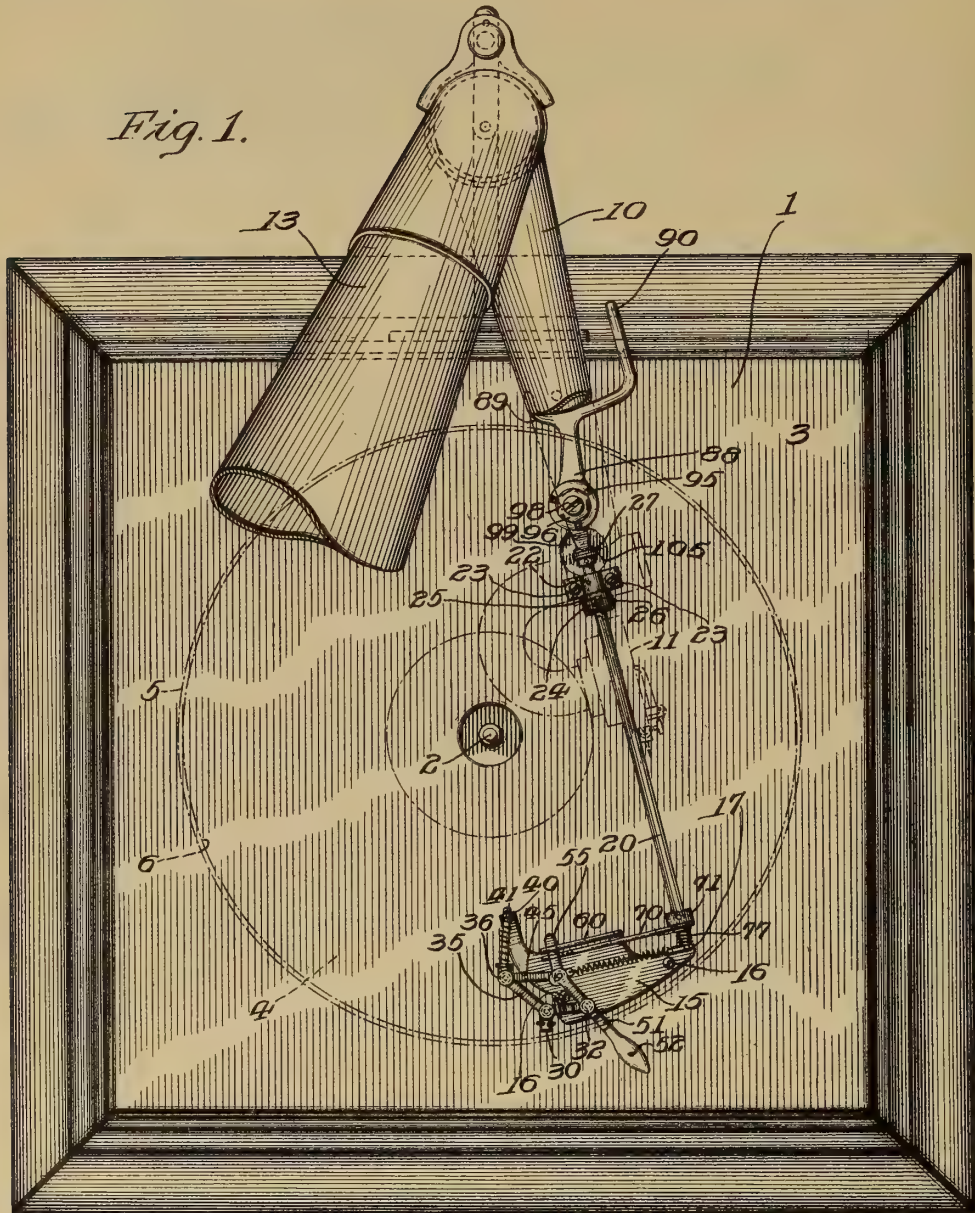
AUTOMATIC BRAKE FOR
TALKING MACHINES,

#1,219,379-----W.N.Dennison,
Patented-March 13th, 1917
Filed-September 8th, 1910.

W. N. DENNISON.
 AUTOMATIC BRAKE FOR TALKING MACHINES.
 APPLICATION FILED SEPT. 8, 1910.

1,219,379.

Patented Mar. 13, 1917.
 4 SHEETS—SHEET 1.



INVENTOR

Wilburn N. Dennison.

WITNESSES

W. J. Hartman.

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4 SHEETS—SHEET 2.



Fig. 8.

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W. N. DENNISON.
 AUTOMATIC BRAKE FOR TALKING MACHINES.
 APPLICATION FILED SEPT. 8, 1910.

1,219,379.

Patented Mar. 13, 1917.
 4 SHEETS—SHEET 3.

Fig. 3.

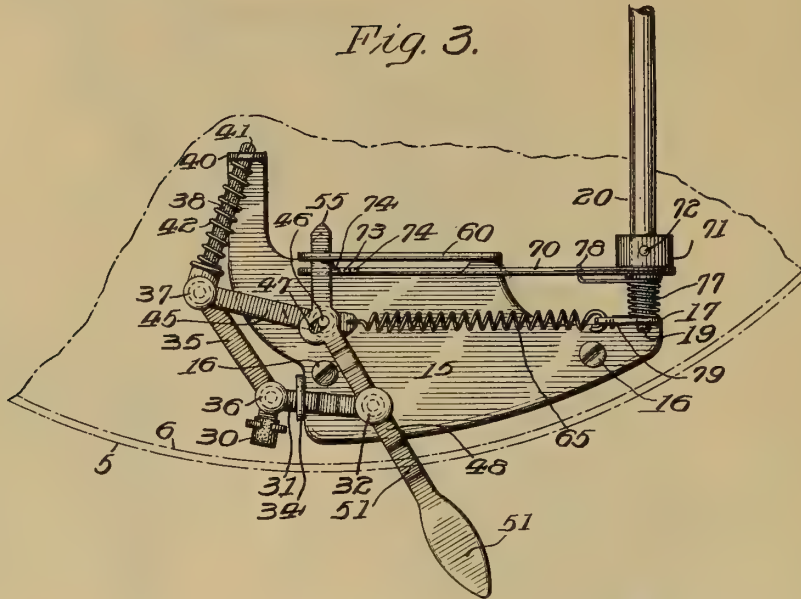
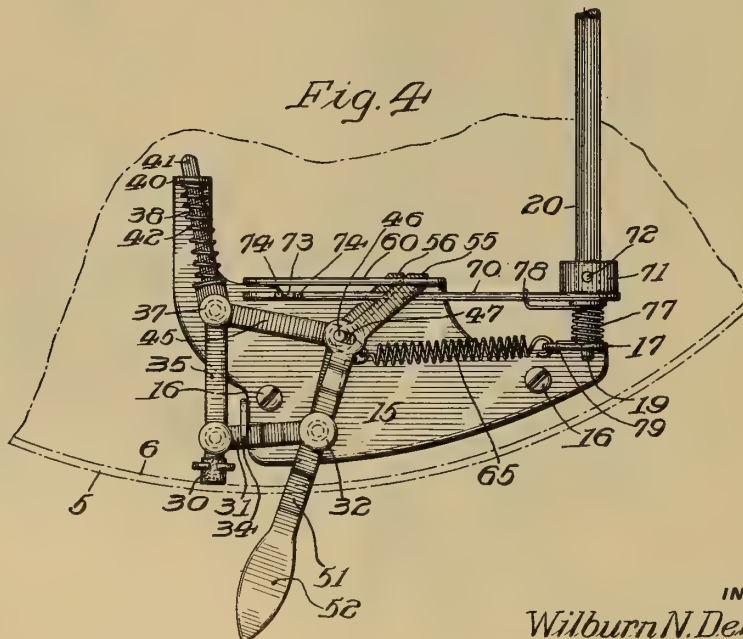


Fig. 4.



WITNESSES
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Horace C. [Signature]

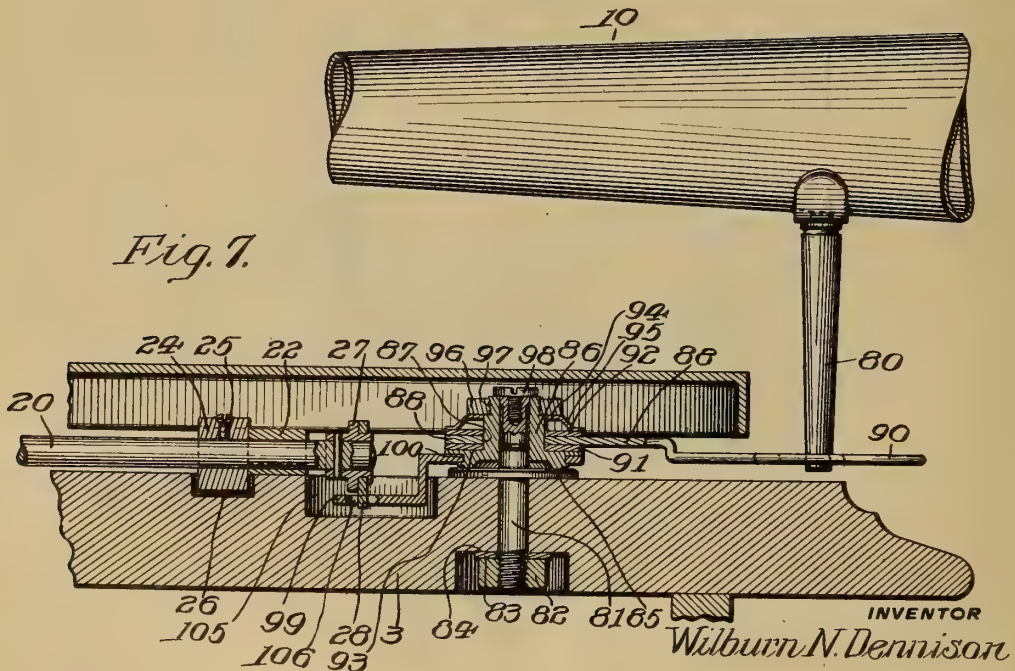
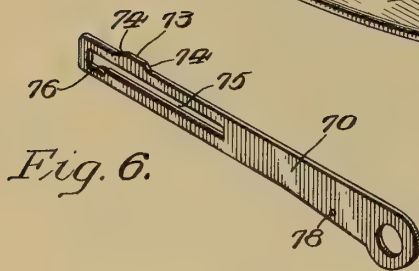
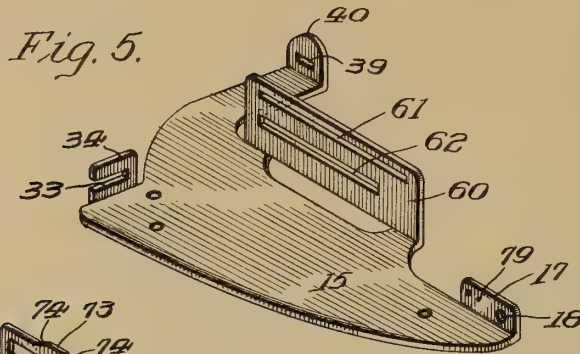
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 AUTOMATIC BRAKE FOR TALKING MACHINES.
 APPLICATION FILED SEPT. 8, 1910.

1,219,379.

Patented Mar. 13, 1917.
 4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC BRAKE FOR TALKING-MACHINES.

1,219,379.

Specification of Letters Patent.

Patented Mar. 13, 1917.

Application filed September 8, 1910. Serial No. 531,022.

To all whom it may concern:

Be it known that I, WILBURN N. DENNISON, a citizen of the United States, and a resident of the borough of Merchantville, county of Camden, and State of New Jersey, have invented certain new and useful Improvements in Automatic Brakes for Talking-Machines, of which the following is a full, clear, and exact disclosure, reference being had to the accompanying drawings, forming a part of this specification.

The main objects of this invention are, to provide an improved brake adapted to be used in combination with a talking machine; to provide an improved automatic brake for a talking machine which may be actuated either automatically by the operation of the talking machine or which may be actuated manually; to provide a stop mechanism with means permitting the setting thereof to effect the stopping of the turn-table at substantially any predetermined point in the sound reproduction and permitting the adjustment thereof to operate with sound records of different lengths; to provide a stop mechanism with frictional means permitting the actuating member of said mechanism to be adjusted to different positions in the path of the tone arm; to provide a stop mechanism with a pair of coaxially pivoted members one of which operates to effect the stopping of the turn-table and the other of which is operated by the tone arm, together with a frictional connection between said members; to provide an improved brake in which the braking action will take place gradually and with gradually increasing force; to provide in combination with a talking machine having a turntable for supporting disk records and provided with a downwardly projecting annular flange, an improved automatic brake, the main portion of which is arranged beneath the turntable and which is adapted to engage against the inner surface of the annular flange of the turntable; and to provide other improvements as will appear hereinafter.

In the drawings, Figure 1 is a fragmentary top plan view of a talking machine provided with an automatic brake constructed in accordance with this invention; Fig. 2 a fragmentary perspective of the same; Fig. 3 a fragmentary perspective of the same showing the brake in operative position;

Fig. 4 a fragmentary perspective of the same showing the brake in inoperative position; Figs. 5 and 6 are perspectives of details of the same; Fig. 7 is a fragmentary side elevation partly in vertical section, of a portion of the same; and Figs. 8 and 9 are fragmentary views of a modified detail of construction.

Referring to the drawing, one embodiment of this invention comprises a talking machine provided with the usual or any suitable casing or cabinet 1, containing the usual actuating mechanism for rotating the usual spindle 2, which projects upwardly through the upper side 3, of the casing 1, and which carries mounted upon its upper end a flat circular turntable 4, arranged above the upper side of the casing 1, and provided with a downwardly extending marginal annular flange or rim 5, having a cylindrical inner surface 6, coaxial of the axis of rotation of the turntable.

The talking machine is provided with the usual or any suitable hollow tone arm 10, carrying at its inner end a sound reproducer or sound box 11, adapted to cooperate as usual with a record mounted upon the turntable. The outer end of the tone arm 10 is pivotally supported as usual, and may communicate with any suitable amplifier 13.

Arranged beneath the turntable 4, and within the marginal flange 5 thereof, is a plate 15, which forms a base or support for some of the movable portions of this improved brake. This plate is detachably secured to the upper surface of the upper side 3 of the motor casing, by screws 16 or by other suitable means, and has an upwardly projecting ear 17 at one end, provided with a circular aperture 18 forming a bearing for a reduced end 19 of a rock shaft 20, the shoulder between this reduced end and the main portion of the shaft being in engagement with the inner surface of the ear 18, to prevent movement of the shaft longitudinally toward the ear. The shaft 20 preferably extends rearwardly, obliquely of the casing 1 and parallel to the upper surface of the casing, the rear portion of the shaft being rotatably supported in a bearing 22, arranged beneath the turntable, and detachably connected to the upper side 3 of the casing by screws 23, through suitable means. To prevent longitudinal movement of the shaft 20 rearwardly, a collar 24 is adjust-

ably secured to the shaft by means of a set screw 25, the collar being arranged to bear against the front end of the bearing 22, a recess 26 being provided in the upper side 3 of the casing beneath the collar, in which the collar is freely rotatable. On the rear end of the shaft 20 and in the rear of the bearing 22, is rigidly secured a collar 27, having projecting rearwardly downwardly therefrom and rigid therewith, a stud 28 forming a crank whereby the shaft 20 may be rotated automatically by means to be hereinafter described, the upper side 3 of the casing being provided with a suitable recess.

A brake shoe or pad 30 is located beneath the turntable and adjacent the internal surface of the rim 5 of the turntable 4. This brake shoe 30 is mounted upon the free end of one branch of an angular arm or bell crank lever 31, the other branch of which is pivoted adjacent its outer end to the base 15 of the brake, upon a vertical stud 32, this latter branch of the lever being mounted to slide horizontally about its pivot in a horizontal slot 33, formed in the forward edge of an upturned portion 34 of the base 15, the walls of the slot 33, forming a guide for the arm as it oscillates.

To oscillate the brake pad 30 in a horizontal plane about its pivot 32, to throw it into and out of engagement with the internal cylindrical surface 6 of the rim 5 of the turntable, a flat link 35 is pivoted at one end to the arm 31, adjacent its vertex in the rear of the pad 30 by a vertical headed pintle 36, and at its other end to a laterally movable vertical pintle 37, to which is also pivoted one end of a flat link 38, the other end of which extends rearwardly and is loosely and slidably mounted in a horizontal slot 39, of an upturned portion or bearing 40, of the base 15. The rear end of the latter link 38 is provided with a pin 41 in the rear of its bearing 40, and between the bearing 40 and the pintle 37, this link is surrounded by a compressed spiral spring 42, which normally forces this link forwardly and keeps the pin 41 at the rear end of the link always in engagement with the rear surface of the bearing 40.

The two links 35 and 38, and their connecting pintle 37 are combined in the form of a toggle joint which is actuated by an intermediate link 45, one end of which is pivoted upon the pintle 36, and the other end of which extends inwardly and is provided with a stud 46 rigid therewith, which projects above and below this link. The upper end of the stud 46 engages loosely in an oblong slot 47, of a hand lever 48, which is pivoted intermediate of its ends on the vertical stud 32 which is rigid with the base 15 of the brake, and to which the brake pad 30 is also pivoted, as hereinbefore described. The lower end of the stud 46 engages snugly

but rotatively in an aperture provided therefor in a secondary lever 50, intermediate the ends thereof. One end of this secondary lever is pivoted below the hand lever 48 upon the stud 32, upon which the hand lever is mounted to oscillate. This secondary lever 50 is thus movable independently of the hand lever 48, through a distance equal to the free movement of the upper end of the stud 46, in the oblong slot 47 of the hand lever. The outer portion of the hand lever 48 is looped downwardly as at 51 freely below the under edge of the rim 5 of the turntable to permit the free movement of the lever and then projects outwardly in the form of a handle 52.

For guiding the inner end 55 of the hand lever and the inner end 56 of the secondary lever to move in parallel horizontal planes, the inner portion of the base plate 15 is bent upwardly into a plane at right angles to the rock shaft 20, forming a guide standard 60 which is provided with two oblong parallel horizontal slots 61 and 62, the upper one 61 of which has a width equal to the thickness of the inner end 55 of the hand lever, and the lower one 62 of which has a width equal to the thickness of the inner end 56 of the secondary lever. The outer ends of these slots terminate in substantially the same vertical planes, and the slots are of sufficient length to permit of the necessary movements of the levers.

For automatically swinging the brake shoe 30 into an operative position from an inoperative position, a spiral spring or other yielding member 65 is connected at one end to the secondary lever 50 intermediate of its ends, and at its other end to the upturned portion 17 of the base plate 15. This yielding member 65 is preferably maintained at all times under a tension tending to elongate the same, and tends to draw the free end of the secondary lever rearwardly to actuate through the link 45 and pintle 37, the two links 35 and 37 of the toggle joint controlling the movement of the brake pad 30.

For holding the brake shoe 30 in inoperative position, a catch is provided which comprises an oblong flat crank arm 70, arranged upon the inside of and in sliding contact with the upturned portion 60 of the base 15. The inner end of this catch 70 is provided with a hub or collar 71 rigid therewith, surrounding the rock shaft 20 and detachably fixed thereon by a pin 72 extending through the collar. This catch plate 70 is provided upon its upper edge adjacent its outer or free end, with an upwardly projecting lug 73, the outer and inner edges 74 of which converge upwardly and normally project into the path of the inner end of the hand lever 48. This catch plate is also provided in its outer portion

with an oblong slot 75, extending longitudinally of the plate. The inner portion of this slot 75 is substantially the same width as the thickness of the free end of the secondary lever 50, and the lower wall of this slot is recessed adjacent the outer end of the slot, to receive the free end of the secondary lever 50, and to provide an abrupt outwardly facing substantially vertical shoulder 76, adapted to hold the free end of the secondary lever 50 against movement when the brake is set in its inoperative position. The free end of the catch plate 70 is normally forced upwardly by means of a spiral spring 77, surrounding the rock shaft 20 between the catch plate 70 and the front bearing 18 of the rock shaft, one end of the spring 77 being secured in an aperture 78 provided therefor in the catch plate 70, and the other end of the spring being secured in an aperture 79 provided therefor in the upturned portion 17, of the base 15.

The outer inclined edge wall 74 of the lug 73 intersects the upper edge wall of the catch plate 70 in a line substantially in vertical alinement with the shoulder 76 formed by the recessed portion of the slot 75 in the plate, and the proportions and arrangements of the slot 75 and its recess, and the proportions of the secondary lever 50, hand lever 48 and oblong slot 47 of the hand lever are such that the inner free end 55 of the hand lever may be brought into a position upon the upper edge of the catch plate 70, between the lug 73 and the forward end of the plate and when in this position, the inner end 56 of the secondary lever will be brought into position in the recess in front of and against the shoulder 76 of the slot 75 of the plate. The oblong slot 47 of the hand lever permits the inner end of the hand lever to be oscillated inwardly against the adjacent inclined wall 74 of the lug 73 of the catch plate, and to be brought into position upon the top wall of the lug, forcing the catch plate downwardly with respect to the secondary lever 50, and releasing the inner free end of the secondary lever from engagement with the shoulder 76, whereupon the free end of the secondary lever will be drawn inwardly toward the rock shaft 20 in the slot 75 of the catch plate and into engagement with the inner end wall of the slot, which limits the inward movement of the secondary lever. This movement of the secondary lever takes up the lost motion between the secondary lever and the hand lever and carries the free end of the hand lever rearwardly to the inner end of the slot 61 in the guide standard 60.

From the above description it is evident that when it is desired to release the brake from the turntable to start the talking ma-

chine, or in other words, when it is desired to set the brake in an inoperative position, the handle 52 of the hand lever 48, is forced manually inwardly or toward the rock shaft 20. This inward movement of the handle 52 takes up the lost motion between the hand lever and the stud 46 of the intermediate link 45, and this link is moved outwardly, moving the pintle 36 of the toggle joint outwardly against the action of the spring 65, and swinging the brake shoe 30 inwardly and into inoperative position. During this movement of the hand lever, the catch plate 70 is held in its lowermost position by the free end of the secondary lever 50 sliding against the lower wall of the slot 75 of the catch plate, and the upper edge of the lug 73 of the catch plate is maintained below the lower wall of the slot 61 of the guide standard 60, until the free end of the secondary lever passes in front of and clears the shoulder 76 of the catch plate, whereupon the free end of the catch plate is automatically lifted by means of the spring 77, and the brake is thus automatically located in the inoperative position as shown in Figs. 2 and 3.

When the brake is thus set in its inoperative position, it may be released either manually by moving the hand lever 48, or automatically, as will be described hereinafter. For manually releasing the brake, the handle 52 of the hand lever 48 is moved outwardly or away from the rock shaft 20, whereupon the inner end 55 of the hand lever will act upon the inclined shoulder 74 of the catch plate and force it downwardly, thus releasing the inner end 56 of the secondary lever from engagement with the abrupt shoulder 76 of the catch plate, whereupon the inner end of the secondary lever will be drawn toward the rock shaft 20 by the spring 65, taking up the lost motion between the secondary lever and the hand lever, and moving the hand lever with the secondary lever.

This movement of the secondary lever is transmitted through the link 45 to the pintle 37 of the toggle joint and through the toggle joint to the brake pad 30, which is thus moved outwardly away from the axis of the turntable and into engagement with the inner surface of its rim. The brake pad is thus brought into engagement with the rim of the turntable, before the secondary lever has completed its movement and before the pintle 37 of the toggle joint has been brought to its dead center or into alinement with the outer ends of the links 35 and 38 of the joint.

The brake pad having thus been brought into engagement with the rim of the turntable, the secondary lever continues its movement under the action of the spring until the free end of the secondary lever is

brought to a stop against the end wall of the slot in the catch plate. This additional movement of the secondary lever after the initial engagement of the brake pad compresses the spiral spring 42, surrounding the rear link 38 of the toggle joint, and forces the free end of this link rearwardly through its bearing 39 in the plate 40, as shown in Fig. 4, thus gradually increasing the pressure of the friction pad upon the rim of the turntable.

For automatically applying the brake after it has been manually set in an inoperative position as heretofore described, improved means are employed adapted to be actuated by a movable part of the talking machine, to rotate the rock shaft 20, when desired, to swing the free end of the catch 70 downwardly a sufficient distance to release the inner end 56 of the secondary lever. One embodiment of such means comprises, as shown in the drawings, a vertical stud 80 rigidly secured at its upper end to the under side of the tone arm 10, and terminating at its lower end in the rear of the turntable and in proximity to the upper surface of the top 3 of the motor casing of the talking machine.

Arranged between this stud 80 and the collar 27 at the rear end of the rock shaft 20, is a vertical pivot 81 which projects upwardly from the top 3 of the motor casing and is rigidly secured thereto in any suitable manner; for instance, by having its lower portion extend through the top 3, and having a nut 82 threaded upon the lower end of the pivot and engaging against a washer 83 interposed between the nut and a counterbored seat 84 in the under side of the top 3, the pivot being also provided with a flat circular washer 85 rigidly secured thereto concentric therewith, and bearing against the upper surface of the top 3 of the casing.

Snugly but rotatably mounted upon the upper portion of the pivot 81 is a sleeve 86, the lower face of which bears against the upper face of the washer 85. The upper portion of this sleeve is reduced in diameter to form a cylindrical bearing 87 coaxial with the pivot. Upon this bearing 87 is rotatively mounted one end of a substantial flat horizontal arm 88, which extends rearwardly from the pivot 81, and the outer end of which is bifurcated to form two fingers 89 and 90, forming a horizontal yoke which may be arranged in the path of and to embrace the lower end of the stud 80 of the tone arm. This flat arm is frictionally and adjustably retained in any desired position of rotation with respect to the pivot 81 by means of two friction washers 91 and 92, made of fiber or leather or other suitable material. One of these washers surrounds

the sleeve 86, between the arm and the flat 65 annular shoulder 93, formed between the lower portion and the upper reduced portion of the sleeve, and the other surrounds the reduced portion of the sleeve and is in engagement with the upper side of the arm. 70

The arm 88 is yieldingly pressed between these two washers 91, 92, by means of a yielding spider 94 made of tempered steel or other suitable material, the arms 95 of which engage against the upper friction washer 92. The spider is adjustably held in engagement with the upper friction washer, by means of a nut 96, which is threaded upon the upper end of the sleeve 86, the upper end being preferably reduced 80 for this purpose to provide an annular shoulder 97 between the threaded portion and the main portion of the sleeve, against which the nut may be tightly clamped. The sleeve 86 is detachably held against upward 85 movement by a cap screw 98, threaded into the upper end of the pivot, the head of the screw being clamped tightly against the end of the pivot and overlapping loosely the upper end of the sleeve, the sleeve preferably having a slight amount of end movement between the head of the screw 98 and the washer 85.

For transmitting the rotary movement of the sleeve 86 to the rock shaft 20, an offset 95 arm 99 is rigidly secured at one end to the lower end of the sleeve 86, in an annular recess 100 provided therefor. The free end of this offset arm is freely movable in a recess 105 provided therefor in the upper 100 side of the top 3 of the motor casing, and this free end is provided with an oblong slot 106, in which loosely engages the stud 28, rigid with the collar 27, of the rock shaft 20. 105

By this construction the arm 88, carrying the fingers 89 and 90, is connected to the sleeve 86 with sufficient pressure to release the brake, through the action of the arm 99 and stud 28, without moving the yoke or fingers 89 and 90 with respect to the sleeve 86. The arm 88, however, may be easily and quickly moved into any desired position of adjustment with respect to the sleeve 86, by applying a pressure to its free end slightly in excess of the amount of pressure needed to release the brake. The arm may thus be adjusted so that the stud 80 will be brought into engagement with the inner finger 89 of the arm at any desired point in the movement of the tone arm 10, to apply the brake automatically, and the adjustment may obviously be made so that when the tone arm has reached the end of its path in playing any record, the machine 125 will be automatically stopped.

In the operation of this automatic brake, the lower end of the stud 80 of the tone arm

is located in the yoke between the fingers 89 and 90, and moves freely between these fingers in its path across the record. After the brake has been applied by the engagement of the stud 80 with the finger 89 as heretofore described, the tone arm may then be swung freely outwardly to bring it into a starting position, and by a further outward movement the stud 80 may be brought into engagement with the outer finger 90 of the arm 88 to effect an outward adjustment of the arm with respect to its sleeve 86. The arm may thus be adjusted either inwardly or outwardly by the movement of the tone arm. The stopping mechanism may be set in two ways. The first is by swinging the tone arm 10 outwardly beyond the record until the stud 80 engages the finger 90 and consequently moves the inner finger 89 to a position in which it must be engaged by the stud 80, when the tone arm 10 is swung inwardly, before the stylus is in alinement with the innermost convolution. The tone arm 10 is then swung inwardly until the stylus is in alinement with the innermost convolution of the record, whereupon the stud 80 will engage the finger 89 and turn the lever 88 upon its pivot, such motion being permitted by reason of the friction between the two arms 88 and 99. When the stylus is in alinement with the inner convolution of the record, the finger 89 will have been automatically adjusted to stopping position. The tone arm is then swung outwardly until the stylus is in alinement with the outermost convolution of the record and in coming to such position the stud 80 will not have engaged the finger 90. The lever 52 is then operated to move the brake 30 in to the position shown in Fig. 1 and the stylus placed in the outer end of the groove. After the tone arm 10 has swung again over the record by reason of the engagement of the needle with the groove of the record tablet, the stud 80 will again come into engagement with the finger 89 and moving it slightly will trip the braking mechanism and stop further rotation of the turntable. The engagement of the stud 80 with the finger 90 whenever the swinging arm 10 is moved outwardly to a position in which the stylus is outside of the outermost convolution of the record tablet, is for the purpose of moving the inner finger 89 to a position in which it must be engaged by the stud 80, as the arm 10 is swung inwardly, before the stylus is in registration with the inner end of the record groove, thus enabling the operator to always set the device by the arm 10 to operate at the end of the reproduction of sound of any selected record if he so desires, irrespective of the diameter of the inner convolution of the record groove.

The other way of setting of the mechanism

may be employed when the lever 88 is in such a position that the finger 89 would not be engaged by the stud 80 when the stylus is in the innermost convolution of the sound record groove. The mechanism may then be set so that it will operate automatically at the end of the reproduction of sound from a particular record tablet by swinging the arm 10 to bring the stylus into alinement with the innermost convolution and then swinging the outer finger 90 outwardly to move the lever 88 outwardly until the finger 89 is brought in engagement with the stud 80. After that the stylus is placed in the outer convolution and the brake pad 30 moved out of engagement with the turntable.

In Figs. 10 and 11 is shown a modified construction for imparting the motion from the swinging tone arm 10 to the mechanism for releasing the brake automatically. This mechanism is similar to that illustrated in Figs. 2 and 7 of the drawing, but in this form of the device, the fingers 89' and 90' of the arm 88' are arranged substantially vertical instead of horizontal, and are mounted firmly upon the rock shaft 20. In this form of the device, a disk 107 is securely fastened or attached to the rock shaft 20, as by a pin 108, extending through a flange or hub 109 on said disk 107, and through said rock shaft 20. Adjacent this disk 107, which is provided with a plane face, is arranged the friction washer 91 loose on the shaft 20, and adjacent the washer 91 is the arm 88', also loose on the shaft 20. Adjacent and beyond said arm 88' is the other washer 92, which is clamped or pressed against the arm 88', by the arms 95 of the yielding spider 94, which, in turn, may be held in a predetermined position by a nut 96' threaded over the end of the rock shaft 20, and prevented from accidental turning or displacement in any suitable manner, as by a check nut 110.

In applying this invention, it is obvious that various modifications might be made to meet various conditions, and that many changes might be made in the constructions hereinbefore described without departing from the spirit of this invention or the scope of the appended claims.

Having thus fully described this invention, I claim and desire to protect by Letters Patent of the United States:

1. An automatic brake, comprising a brake member, a rock-shaft mounted to oscillate in a fixed axis, a catch carried by said rock-shaft to hold said brake member in inoperative position, and means pivoted upon an axis transverse to the axis of said rock-shaft for automatically rotating said rock-shaft to release said catch.

2. An automatic brake, comprising a brake member, a rock-shaft, a catch carried

by said rock-shaft to hold said brake member in inoperative position, and means for rotating said rock-shaft to release said catch, said latter means comprising two co-axially rotatable members frictionally retained in predetermined relationship with respect to each other with sufficient force to release said brake member, but freely adjustable rotatably with respect to each other by a pressure slightly in excess of the pressure required to release said brake member.

3. The combination in an automatic brake, of a brake member, means for releasing said brake member, comprising two co-axially rotatable members frictionally retained in predetermined relationship with respect to each other with sufficient force to release said brake member, but freely adjustable rotatably with respect to each other by a pressure slightly in excess of the pressure required to release said brake member.

4. The combination in an automatic brake, of a brake member catch for holding said brake member in inoperative position, and means for releasing said catch, said means comprising two members frictionally retained to predetermined relationship with respect to each other, with sufficient force to release said catch, but movable with respect to each other in response to a force slightly in excess of the force required to release said catch.

5. An automatic brake comprising a brake member, a rock-shaft, an oscillatory catch rigid with said rock-shaft to hold said brake member in inoperative position, and oscillatory means pivoted upon a fixed axis for automatically rotating said rock-shaft to release said catch.

6. An automatic brake, comprising a movable brake member, means for moving said brake member into operative position, and means for holding said brake member in inoperative position, said last mentioned means comprising a rock-shaft, yielding means tending to rotate said rock-shaft through a limited arc, a catch-plate rigid with said rock-shaft and provided with a slot having a recess forming an internal shoulder, and a lever operatively connected to said brake member having a free end arranged to reciprocate in said slot and adapted to be engaged by said shoulder.

7. An automatic brake, comprising a movable brake member, means for moving said brake member into operative position, and means for holding said brake member in inoperative position, said last mentioned means comprising a rock-shaft, yielding means tending to rotate said rock-shaft through a limited arc, a catch-plate rigid with said rock-shaft and provided with a slot having a recess forming an internal shoulder, a lever operatively connected to said brake member having a free end ar-

ranged to reciprocate in said slot and adapted to be engaged by said shoulder, and means for rotating said rock-shaft to release said lever from said shoulder.

8. In a stop mechanism, the combination with a braking member, of a pivoted catch member arranged to hold said braking member in an inoperative position, a pivoted arm for releasing said catch, and a frictional connection intermediate said arm and said catch member, whereby movement is communicated to said catch member to release said braking member when said arm is moved in one direction.

9. In a stop mechanism, the combination of a brake member, a catch for moving said brake member to an operative position, means for holding said brake member in an inoperative position, means for actuating said catch and means including a frictional connection intermediate said actuating means and said catch for causing said catch to move with the actuating means to release the brake and also permitting the actuating means to be moved independently of the catch for adjustment.

10. In a stop mechanism, the combination of a pair of coaxially pivoted members, one of which is free, braking means releasable by the other of said members, and frictional means between said members causing said members to move together about their pivot to release the braking means and also permitting said free member to be moved relatively to the other member for adjustment.

11. In a stop mechanism, the combination of a pair of coaxially pivoted arms, a movable brake member releasable by one of said arms, and frictional means connecting said arms and permitting the other of said arms to move both with and relatively to said last mentioned arm and to actuate the same when moving therewith in one direction about the pivotal axis of said arms.

12. In a stop mechanism, the combination of a movable brake member, releasing mechanism therefor, and actuating means for and connected to said releasing mechanism, and movable both with and relatively to said releasing mechanism, and arranged to move therewith when actuating said releasing mechanism.

13. In a device of the class described, a swinging member, a rotary member, a brake and means for propelling the same against a portion of the rotary member, and means for releasing said brake when the swinging member reaches a predetermined position, said brake releasing means including in its construction two arms pivoted to a base in frictional relation one to another, one adapted to be automatically adjusted with regard to the other by shifting said swinging member over the rotary member to the point

where it is desired to stop the rotary member.

14. In a device of the class described, a swinging member with a projection secured thereto, an arm adapted to engage said projection, a pivot on which said arm is mounted, a second arm mounted on said pivot, frictional means connecting said arms so that one may be moved relatively to the other when sufficient force has been applied to overcome the friction between them, a spring actuated brake engaged by said second arm, and a rotary member against which said brake impinges.

15. In a device of the class described, a swinging member with a projection secured thereto, an arm adapted to engage said projection, a pivot on which said arm is mounted, a second arm mounted on said pivot, frictional means connecting said arms so that one may be moved relatively to the other when sufficient force has been applied to overcome the friction between them, a spring actuated brake controlled by said second arm, and a rotary member against which said brake impinges.

16. In a device of the character described, the combination with a rotatable member and a traveling member movable relatively to said rotatable member, of braking mechanism and means adapted to release said braking mechanism for stopping the rotatable member, said releasing means comprising a frictionally mounted device adjustable to a position for releasing the braking mechanism when said members reach a predetermined position by moving the traveling member over the rotatable member to said predetermined position.

17. In a stop mechanism, the combination with a rotatable element and a traveling element movable relatively to said rotatable element, of a movable member for effecting the stopping of said rotatable element, a catch for holding said member in a position in which it does not effect the stopping of said rotatable element, means for moving said member to a position in which it is effective for stopping said rotatable element, means for actuating said catch to release said member, and means including a frictional connection intermediate said actuating means and said catch for causing said catch to move with said actuating means to effect the stopping of said rotatable element, and also permitting said actuating means to be moved independently of said catch into predetermined adjusted positions in the path of said traveling element.

18. In a stop mechanism, the combination with a rotatable element, of a pair of coaxially pivoted arms one of which is free, a movable member releasable by said other arm to effect the stopping of said rotatable

element, and frictional means connecting said arms, said free arm moving with said other arm under a force sufficient to actuate said other arm and also moving relatively to said other arm under force sufficient to overcome said friction.

19. In a stop mechanism, the combination with a rotatable element and a traveling element movable relatively to said rotatable element, of mechanism for effecting the stopping of said rotatable element, and means adapted to release said mechanism to effect a stopping of said rotatable element, said releasing means comprising a frictionally mounted device adjustable to a position for releasing said mechanism when said elements reach a predetermined position, by moving said traveling element over said rotatable element to said predetermined position.

20. In a stop mechanism, the combination with a rotatable element and a traveling element movable relatively to said rotatable element, of mechanism for stopping the said rotatable element and means adapted to release said mechanism for effecting the stopping of said rotatable element, said means comprising a pair of arms pivoted together, one of which is relatively free and the other of which coacts with said stopping mechanism, said free arm being provided with separated branches, one branch being arranged to be engaged by said traveling element to move said free arm with respect to the other arm and adjust it to a position to actuate said stop mechanism a predetermined point in the travel of said traveling element across said rotary element, and the other of said branches being arranged to be engaged by said traveling element and moved with respect to the other of said arms in swinging said traveling element to the limit of its motion in the opposite direction.

21. In an automatic brake, the combination with a rotatable element and a traveling element movable relatively thereto, of mechanism for effecting the stopping of the rotatable element, and means for releasing said mechanism, said means including a pair of coaxially pivoted members, one of which co-acts with said mechanism and the other of which is relatively free and is located in the path of said traveling element and adapted to be operated thereby, and means for causing said first mentioned member to move with said free member about their axis to release said stopping mechanism and for permitting said free member to also have independent movement relative to the other member.

22. In a stop mechanism, the combination of a rotatable element and a traveling element movable relative thereto, of a brake

member normally engaging the rotatable element, a catch for holding the brake member out of engagement with the rotatable element, a rock shaft upon which the catch
5 is mounted, and means located in the path of and operated by the movable element for turning the rock shaft.

In witness whereof I have hereunto set my hand this 6th day of September, 1910.

WILBURN N. DENNISON.

Witnesses:

FRANK B. MIDDLETON, Jr.,
CHARLES F. WILLARD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

GRAHAMSONE FILMS 2, 1917, 1918

BRAKE FOR TALKING MACHINES,
#1,219,380-----W.N.Dennison,
Patented-March 13th, 1917.
Filed-July 29th, 1911.

W. N. DENNISON.
BRAKE FOR TALKING MACHINES.
APPLICATION FILED JULY 29, 1911.

1,219,380.

Patented Mar. 13, 1917.
4 SHEETS—SHEET 1.

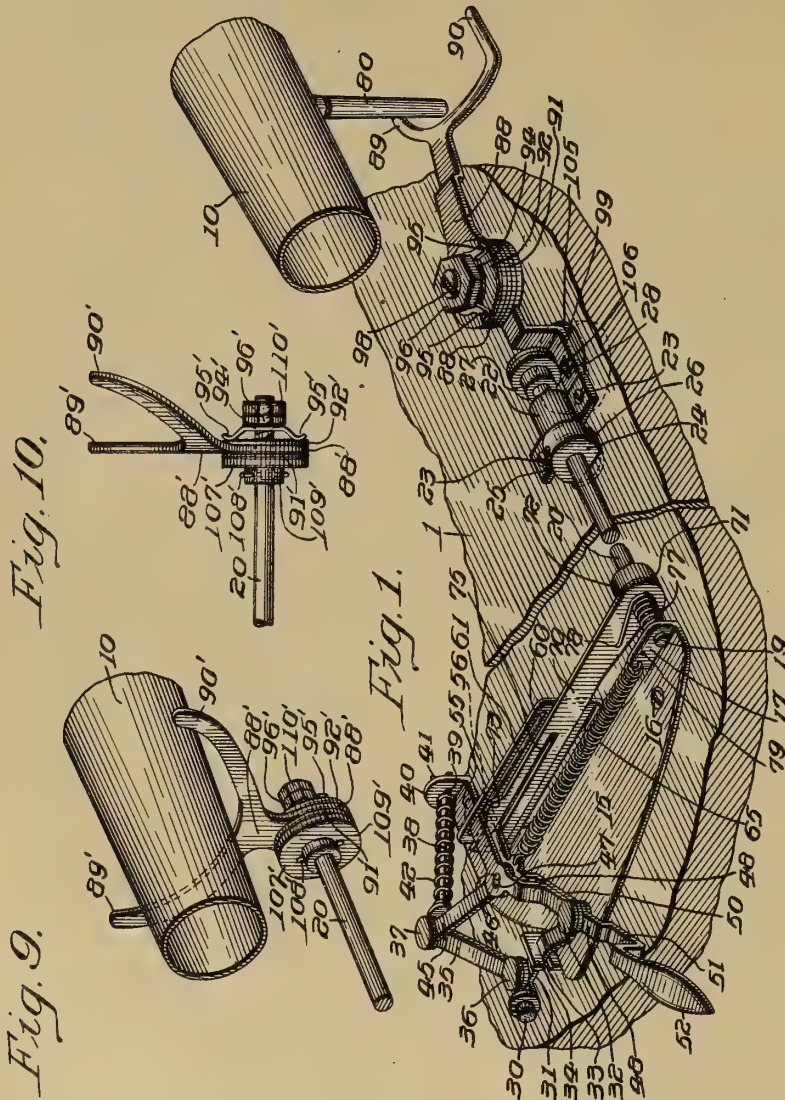


Fig. 9.

Fig. 10.

Fig. 1.

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4 SHEETS—SHEET 2.

Fig. 2.

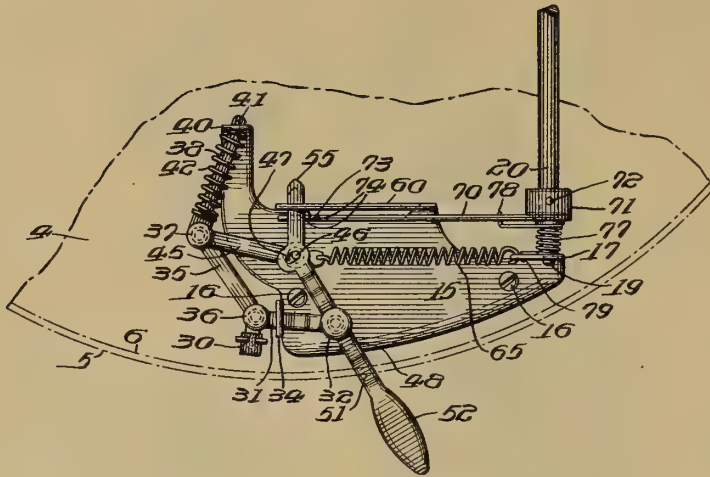
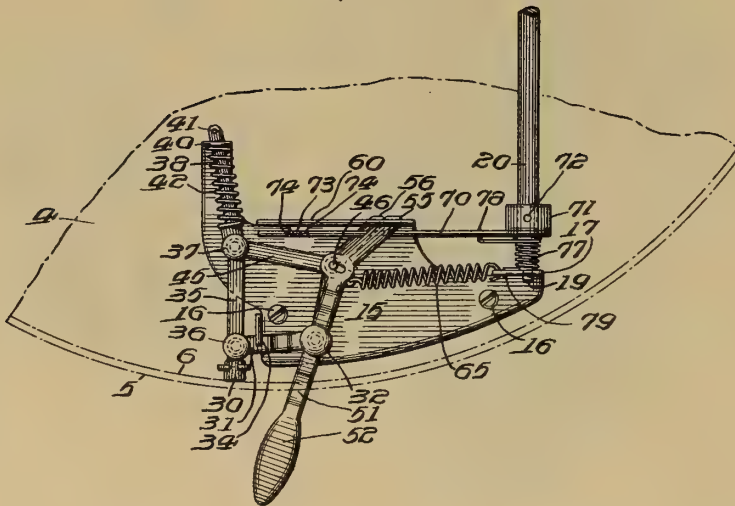


Fig. 3.



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Patented Mar. 13, 1917.
4 SHEETS—SHEET 3.

Fig. 4.

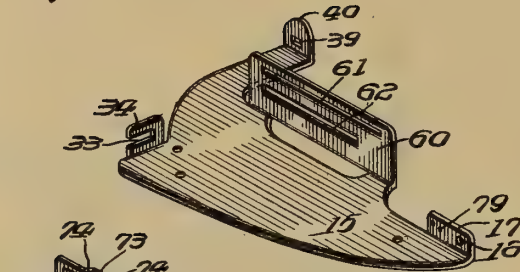


Fig. 5.

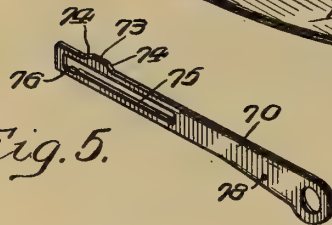
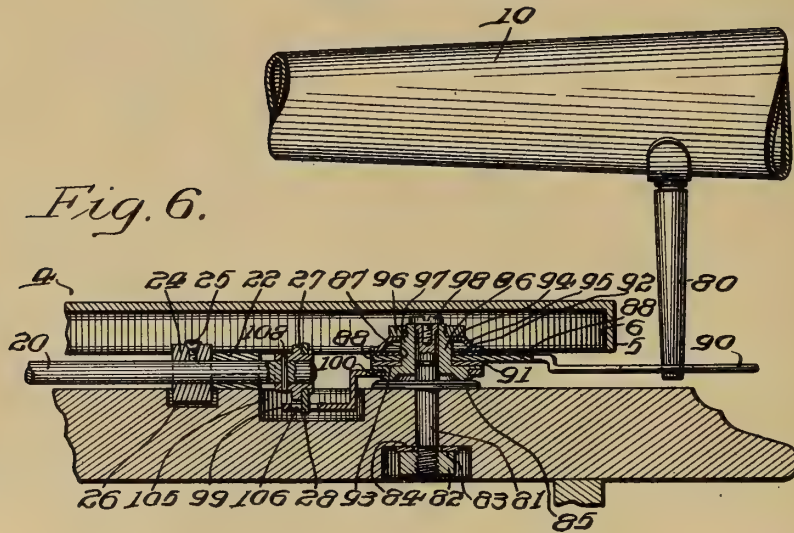


Fig. 6.



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BRAKE FOR TALKING MACHINES.
APPLICATION FILED JULY 29, 1911.

1,219,380.

Patented Mar. 13, 1917.
4 SHEETS—SHEET 4.

Fig. 7.

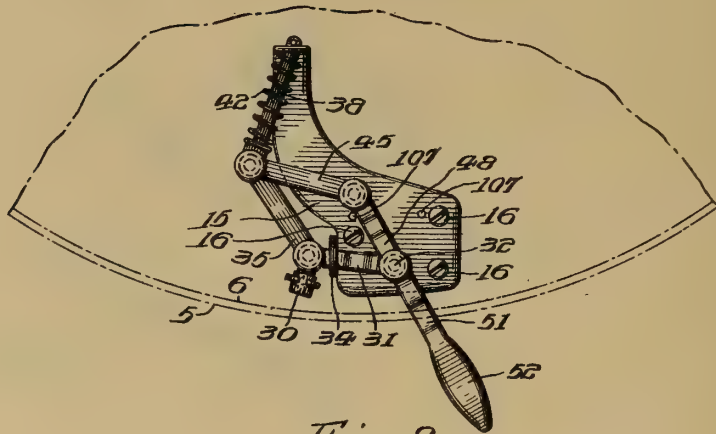
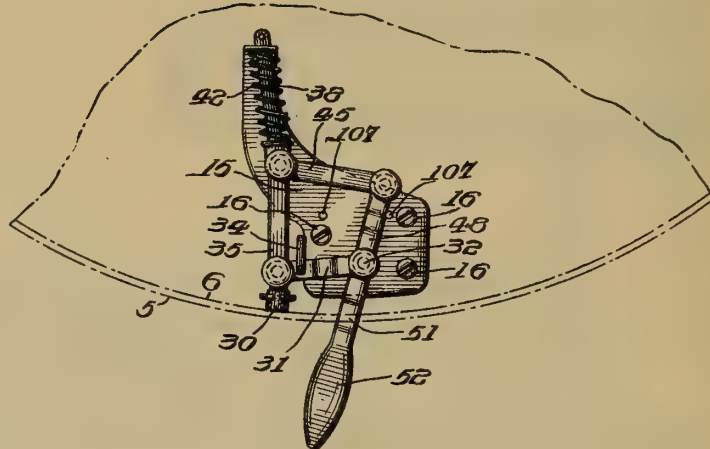


Fig. 8.



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UNITED STATES PATENT OFFICE.

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BRAKE FOR TALKING-MACHINES.

1,219,380.

Specification of Letters Patent. Patented Mar. 13, 1917.

Original application filed September 8, 1910, Serial No. 581,022. Divided and this application filed July 29, 1911. Serial No. 641,274.

To all whom it may concern:

Be it known that I, WILBURN N. DENNISON, a citizen of the United States, and a resident of the borough of Merchantville, county of Camden, and State of New Jersey, have invented certain new and useful Improvements in Brakes for Talking-Machines, of which the following is a full, clear, and exact disclosure, reference being had to the accompanying drawings, forming a part of this specification, this application being a division of my application, Serial Number 581,022, filed September 8, 1910.

The main objects of this invention are, to provide an improved brake adapted to be used in combination with a talking machine; to provide an improved brake for a talking machine which may be actuated either automatically by the operation of the talking machine, or which may be actuated manually; to provide an improved brake in which the braking action will take place gradually and with gradually increasing force; to provide an improved brake, the main portion of which is adapted to be arranged beneath a turn-table, and which is adapted to engage against the inner surface of an annular downwardly projecting flange provided therefor on the turn-table; and to provide other improvements as will appear hereinafter.

In the drawings, Figure 1 is a fragmentary perspective of a brake constructed in accordance with this invention; Fig. 2 a fragmentary top plan view of the same showing the brake in inoperative position; Fig. 3 a top plan view of the same showing the brake in operative position; Figs. 4 and 5 are perspectives of details of the same; Fig. 6 is a fragmentary side elevation, partly in vertical section, of a portion of the same; Figs. 7 and 8 are fragmentary top plan views showing a modified form of this invention in operative and inoperative position, respectively; and Figs. 9 and 10 are fragmentary views of a modified detail of construction.

Referring to the drawings, one embodiment of this invention is shown applied to a talking machine comprising the usual or any suitable casing or cabinet 1, containing the usual actuating mechanism for rotating the usual flat circular turn-table 4, arranged

above the upper side of the casing 1, and provided with a downwardly extending marginal annular flange or rim 5, having a cylindrical inner surface 6, coaxial of the axis of rotation of the turn-table. The talking machine is provided with the usual or any suitable swinging hollow tone arm 10, adapted to cooperate as usual with a record mounted upon the turn-table.

Arranged beneath the turn-table 4, and within the marginal flange 5 thereof, is a plate 15, which forms a base or support for some of the movable portions of this improved brake. This plate is detachably secured to the upper surface of the upper side of the motor casing 1 by screws 16 or by other suitable means, and has an upwardly projecting ear 17 at one end, provided with a circular aperture 18 forming a bearing for a reduced end 19 of a rock-shaft 20, the shoulder between this reduced end and the main portion of the shaft being in engagement with the inner surface of the ear 17, to prevent movement of the shaft longitudinally toward the ear. The shaft 20 preferably extends rearwardly obliquely of the casing 1 and parallel to the upper surface of the casing, the rear portion of the shaft being rotatably supported in a bearing 22, arranged beneath the turn-table, and detachably connected to the upper side of the casing by screws 23, through suitable means. To prevent longitudinal movement of the shaft 20 rearwardly, a collar 24 is adjustably secured to the shaft by means of a set screw 25, the collar being arranged to bear against the front end of the bearing 22, a recess 26 being provided in the upper side of the casing beneath the collar, in which the collar is freely rotatable. On the rear end of the shaft 20, and in the rear of the bearing 22, is rigidly secured a collar 27, having projecting rearwardly downwardly therefrom and rigid therewith, a stud 28 forming a crank whereby the shaft 20 may be rotated automatically by means to be hereinafter described, the upper side of the casing being provided with a suitable recess.

A brake-shoe or pad 30 is located beneath the turn-table and adjacent the internal surface of the rim 5 of the turn-table 4. This brake-shoe 30 is mounted upon the free end of one branch of an angular arm or bell

crank lever 31, the other branch of which is pivoted adjacent its outer end to the base 15 of the brake upon a vertical stud 32, this latter branch of the lever being mounted to slide horizontally about its pivot in a horizontal slot 33, formed in the forward edge of an upturned portion 34 of the base 15, the walls of the slot 33 forming a guide for the arm as it oscillates.

To oscillate the brake-pad 30 in a horizontal plane about its pivot 32, to throw it into and out of engagement with the internal cylindrical surface 6 of the rim 5 of the turn-table, a flat link 35 is pivoted at one end to the arm 31, adjacent its vertex in the rear of the pad 30 by a vertical headed pintle 36, and at its other end to a laterally movable vertical pintle 37, to which is also pivoted one end of a flat link 38, the other end of which extends rearwardly and is loosely and slidably mounted in a horizontal slot 39, of an upturned portion or bearing 40, of the base 15. The rear end of the latter link 38 is provided with a pin 41 in the rear of its bearing 40, and between the bearing 40 and the pintle 37, this link is surrounded by a compressed spiral spring 42, which normally forces this link forwardly and keeps the pin 41 at the rear end of the link always in engagement with the rear surface of the bearing 40.

The two links 35 and 38, and their connecting pintle 37, are combined in the form of a toggle joint which is actuated by an intermediate link 45, one end of which is pivoted upon the pintle 37 and the other end of which extends inwardly and is provided with a stud 46, rigid therewith, which projects above and below this link. The upper end of the stud 46 engages loosely in an oblong slot 47 of a hand-lever 48, which is pivoted intermediate of its ends on the vertical stud 32, which is rigid with the base 15 of the brake, and to which the brake-pad 30 is also pivoted, as hereinbefore described. The lower end of the stud 46 engages snugly but rotatively in an aperture provided therefor in a secondary lever 50, intermediate the ends thereof. One end of this secondary lever is pivoted below the hand-lever 48 upon the stud 32, upon which the hand-lever is mounted to oscillate. This secondary lever 50 is thus movable independently of the hand-lever 48, through a distance equal to the free movement of the upper end of the stud 46, in the oblong slot 47 of the hand-lever. The outer portion of the hand-lever 48 is looped downwardly, as at 51, freely below the under edge of the rim 5 of the turn-table, to permit the free movement of the lever, and then projects outwardly in the form of a handle 52.

For guiding the inner end 55 of the hand-lever and the inner end 56 of the secondary lever to move in parallel horizontal planes,

the inner portion of the base plate 15 is bent upwardly into a plane at right angles to the rock-shaft 20, forming a guide standard 60 which is provided with two oblong parallel horizontal slots 61 and 62, the upper one 61 of which has a width equal to the thickness of the inner end 55 of the hand-lever, and the lower one 62 of which has a width equal to the thickness of the inner end 56 of the secondary lever. The outer ends of these slots terminate in substantially the same vertical planes, and the slots are of sufficient length to permit of the necessary movements of the levers.

For automatically swinging the brake-shoe 30 into an operative position from an inoperative position, a spiral spring or other yielding member 65 is connected at one end to the secondary lever 50 intermediate of its ends, and at its other end to the upturned portion 17 of the base plate 15. This yielding member 65 is preferably maintained at all times under a tension tending to elongate the same, and tends to draw the free end of the secondary lever rearwardly to actuate through the link 45 and pintle 37, the two links 35 and 38 of the toggle joint controlling the movement of the brake-pad 30.

For holding the brake-shoe 30 in inoperative position, a catch is provided which comprises an oblong flat crank-arm 70, arranged upon the inside of and in sliding contact with the upturned portion 60 of the base 15. The inner end of this catch 70 is provided with a hub or collar 71, rigid therewith, surrounding the rock-shaft 20 and detachably fixed thereon by a pin 72 extending through the collar. This catch-plate 70 is provided upon its upper edge, adjacent its outer or free end, with an upwardly projecting lug 73, the outer and inner edges 74 of which converge upwardly and normally project into the path of the inner end of the hand-lever 48. This catch-plate is also provided in its outer portion with an oblong slot 75, extending longitudinally of the plate. The inner portion of this slot 75 is substantially the same width as the thickness of the free end of the secondary lever 50, and the lower wall of this slot is recessed adjacent the outer end of the slot, to receive the free end of the secondary lever 50, and to provide an abrupt outwardly facing substantially vertical shoulder 76, adapted to hold the free end of the secondary lever 50 against movement when the brake is set in its inoperative position. The free end of the catch-plate 70 is normally forced upwardly by means of a spiral spring 77, surrounding the rock-shaft 20 between the catch-plate 70 and the front bearing 18 of the rock-shaft, one end of the spring 77 being secured in an aperture 78 provided therefor in the catch-plate 70, and the other end of the spring being secured in an aperture 79

provided therefor in the upturned portion 17 of the base 15.

The outer inclined edge wall 74 of the lug 73 intersects the upper edge wall of the catch-plate 70 in a line substantially in vertical alinement with the shoulder 76 formed by the recessed portion of the slot 75 in the plate, and the proportions and arrangement of the slot 75 and its recess, and the proportions of the secondary lever 50, hand-lever 48 and oblong slot 47 of the hand-lever are such that the inner free end 55 of the hand-lever may be brought into a position upon the upper edge of the catch-plate 70, between the lug 73 and the forward end of the plate, and when in this position the inner end 56 of the secondary lever will be brought into position in the recess in front of and against the shoulder 76 of the slot 75 of the plate. The oblong slot 47 of the hand-lever permits the inner end of the hand-lever to be oscillated inwardly against the adjacent inclined wall 74 of the lug 73 of the catch-plate, and to be brought into position upon the top wall of the lug, forcing the catch-plate downwardly with respect to the secondary lever 50, and releasing the inner free end of the secondary lever from engagement with the shoulder 76, whereupon the free end of the secondary lever will be drawn inwardly toward the rock-shaft 20 in the slot 75 of the catch-plate and into engagement with the inner end wall of the slot, which limits the inward movement of the secondary lever. This movement of the secondary lever takes up the lost motion between the secondary lever and the hand-lever and carries the free end of the hand-lever rearwardly to the inner end of the slot 61 in the guide standard 60.

From the above description it is evident that when it is desired to release the brake from the turn-table to start the talking machine, or, in other words, when it is desired to set the brake in an inoperative position, the handle 52 of the hand-lever 48 is forced manually inwardly or toward the rock-shaft 20. This inward movement of the handle 52 takes up the lost motion between the hand-lever and the stud 46 of the intermediate link 45, and this link is moved outwardly, moving the pintle 36 of the toggle joint outwardly against the action of the spring 65, and swinging the brake-shoe 30 inwardly and into inoperative position. During this movement of the hand-lever, the catch-plate 70 is held in its lowermost position by the free end of the secondary lever 50 sliding against the lower wall of the slot 75 of the catch-plate, and the upper edge of the lug 73 of the catch-plate is maintained below the lower wall of the slot 61 of the guide standard 60, until the free end of the secondary lever passes in front of and clears the shoulder 76 of the catch-plate, whereupon the free

end of the catch-plate is automatically lifted by means of the spring 77, and the brake is thus automatically located in the inoperative position, as shown in Figs. 2 and 3. When the brake is thus set in its inoperative position, it may be released either manually, by moving the hand-lever 48, or automatically, as will be described hereinafter.

For manually releasing the brake, the handle 52 of the hand-lever 48 is moved outwardly or away from the rock-shaft 20, whereupon the inner end 55 of the hand-lever will act upon the inclined shoulder 74 of the catch-plate and force it downwardly, thus releasing the inner end 56 of the secondary lever from engagement with the abrupt shoulder 76 of the catch-plate, whereupon the inner end of the secondary lever will be drawn toward the rock-shaft 20 by the spring 65, taking up the lost motion between the secondary lever and the hand-lever, and moving the hand-lever with the secondary lever.

This movement of the secondary lever is transmitted through the link 45 to the pintle 37 of the toggle joint, and through the toggle joint to the brake-pad 30, which is thus moved outwardly away from the axis of the turn-table and into engagement with the inner surface of its rim. The brake-pad is thus brought into engagement with the rim of the turn-table, before the secondary lever has completed its movement and before the pintle 37 of the toggle joint has been brought to its dead center or into alinement with the outer ends of the links 35 and 38 of the joint.

The brake-pad having thus been brought into engagement with the rim of the turn-table, the secondary lever continues its movement under the action of the spring until the free end of the secondary lever is brought to a stop against the end wall of the slot in the catch-plate. This additional movement of the secondary lever after the initial engagement of the brake-pad compresses the spiral spring 42, surrounding the rear link 38 of the toggle joint, and forces the free end of this link rearwardly through its bearing 39 in the plate 40, as shown in Fig. 3, thus gradually applying the pressure of the friction pad upon the rim of the turn-table.

For automatically applying the brake after it has been manually set in an inoperative position, as heretofore described, any suitable means may be employed adapted to be actuated by a movable part of the talking machine, to rotate the rock-shaft 20, when desired, to swing the free end of the catch 70 downwardly a sufficient distance to release the inner end 56 of the secondary lever. One embodiment of such means comprises, as shown in the drawings, a vertical stud 80, rigidly secured at its upper end to the under side of the tone arm 10, and terminating at 130

its lower end in the rear of the turn-table and in proximity to the upper surface of the top of the motor casing of the talking machine.

5 Arranged between this stud 80 and the collar 27 at the rear end of the rock-shaft 20, is a vertical pivot 81, which projects upwardly from the top of the motor casing and is rigidly secured thereto in any suitable manner; for instance, by having its lower
10 portion extend through the top, and having a nut 82 threaded upon the lower end of the pivot and engaging against a washer 83 interposed between the nut and a counterbored seat 84 in the under side of the top, the pivot
15 being also provided with a flat circular washer 85, rigidly secured thereto, concentric therewith, and bearing against the upper surface of the top of the casing.

20 Snugly, but rotatably, mounted upon the upper portion of the pivot 81 is a sleeve 86, the lower face of which bears against the upper face of the washer 85. The upper portion of this sleeve is reduced in diameter to form a cylindrical bearing 87, coaxial
25 with the pivot. Upon this bearing 87 is rotatively mounted one end of a substantial flat horizontal arm 88, which extends rearwardly from the pivot 81, and the outer end of which is bifurcated to form two fingers 89 and 90, forming a horizontal yoke
30 which may be arranged in the path of and to embrace the lower end of the stud 80 of the tone-arm. This flat-arm is frictionally and adjustably retained in any desired position of rotation with respect to the pivot
35 81 by means of two friction washers 91 and 92, made of fiber or leather, or other suitable material. One of these washers surrounds the sleeve 86, between the arm and the flat annular shoulder 93, formed between the lower portion and the upper reduced portion of the sleeve, and the other surrounds the reduced portion of the sleeve
40 and is in engagement with the upper side of the arm.

The arm 88 is yieldingly pressed between these two washers 91, 92, by means of a yielding spider 94, made of tempered steel
50 or other suitable material, the arms 95 of which engage against the upper friction washer 92. The spider is adjustably held in engagement with the upper friction washer, by means of a nut 96, which is threaded upon
55 the upper end of the sleeve 86, the upper end being preferably reduced for this purpose to provide an annular shoulder 97 between the threaded portion and the main portion of the sleeve, against which the nut may be tightly clamped. The sleeve 86 is detachably held against upward movement
60 by a cap-screw 98, threaded into the upper end of the pivot, the head of the screw being clamped tightly against the end of the pivot and overlapping loosely the upper end of

the sleeve, the sleeve preferably having a slight amount of end movement between the head of the screw 98 and the washer 85.

For transmitting the rotary movement of the sleeve 86 to the rock-shaft 20, an offset arm 99 is rigidly secured at one end to the
70 lower end of the sleeve 86, in an annular recess 100 provided therefor. The free end of this offset crank-arm is freely movable in a recess 105 provided therefor in the upper side of the top of the motor casing,
75 and this free end is provided with an oblong slot 106, in which loosely engages the stud 28, rigid with the collar 27 of the rock-shaft 20.

By this construction the arm 88, carrying the fingers 89 and 90, is connected to the sleeve 86 with sufficient pressure to release the brake, through the action of the arm 99 and stud 28, without moving the yoke
80 or fingers 89 and 90 with respect to the sleeve 86. The arm 88, however, may be easily and quickly moved into any desired position of adjustment with respect to the sleeve 86, by applying a pressure to its free end slightly in excess of the amount of pressure
90 needed to release the brake from its catch. The arm may thus be adjusted so that the stud 80 will be brought into engagement with the inner finger 89 of the arm at any desired point in the movement
95 of the tone arm 10, to apply the brake automatically, and the adjustment may obviously be made so that when the tone arm has reached the end of its path in playing any record, the machine will be automatically stopped.

In the operation of this automatic brake, the lower end of the stud 80 of the tone arm is located in the yoke between the fingers
100 89 and 90, and moves freely between these fingers in its path across the record. After the brake has been applied by the engagement of the stud 80 with the finger 89, as heretofore described, the tone arm may then
110 be swung freely outwardly to bring it into a starting position, and by a further outward movement the stud 80 may be brought into engagement with the outer finger 90 of the arm 88, to effect an outward adjustment of
115 the arm with respect to its sleeve 86. The arm may thus be adjusted either inwardly or outwardly by the movement of the tone arm.

The stopping mechanism may be set in two ways. The first is by swinging the tone
120 arm 10 outwardly beyond the record until the stud 80 engages the finger 90 and consequently moves the inner finger 89 to a position in which it must be engaged by the
125 stud 80, when the tone arm 10 is swung inwardly, before the stylus is in alinement with the innermost convolution. The tone arm 10 is then swung inwardly until the stylus is in alinement with the innermost
130

convolution of the record, whereupon the stud 80 will engage the finger 89 and turn the lever 88 upon its pivot, such motion being permitted by reason of the friction between the two arms 88 and 99. When the stylus is in alinement with the inner convolution of the record, the finger 89 will have been automatically adjusted to stopping position. The tone arm is then swung outwardly until the stylus is in alinement with the outermost convolution of the record and in coming to such position the stud 80 will not have engaged the finger 90. The lever 52 is then operated to move the brake 30 in to the position shown in Fig. 1 and the stylus placed in the outer end of the groove. After the tone arm 10 has swung again over the record by reason of the engagement of the needle with the groove of the record tablet, the stud 80 will again come into engagement with the finger 89 and moving it slightly will trip the braking mechanism and stop further rotation of the turntable. The engagement of the stud 80 with the finger 90 whenever the swinging arm 10 is moved outwardly to a position in which the stylus is outside of the outermost convolution of the record tablet, is for the purpose of moving the inner finger 89 to a position in which it must be engaged by the stud 80, as the arm 10 is swung inwardly, before the stylus is in registration with the inner end of the record groove, thus enabling the operator to always set the device by the arm 10 to operate at the end of the reproduction of sound of any selected record if he so desires, irrespective of the diameter of the inner convolution of the record groove.

The other way of setting of the mechanism may be employed when the lever 88 is in such a position that the finger 89 would not be engaged by the stud 80 when the stylus is in the innermost convolution of the sound record groove. The mechanism may then be set so that it will operate automatically at the end of the reproduction of sound from a particular record tablet by swinging the arm 10 to bring the stylus into alinement with the innermost convolution and then swinging the outer finger 90 outwardly to move the lever 88 outwardly until the finger 89 is brought in engagement with the stud 80. After that the stylus is placed in the outer convolution and the brake pad 30 moved out of engagement with the turntable.

As shown in Figs. 7 and 8 of the drawings, the automatic features of the brake may be omitted from the brake hereinbefore described, without otherwise changing the construction or mode of operation of the brake, and the invention may thus be applied to provide a simple and effective non-automatic brake.

In this modified form of the invention,

the brake is practically identical with that hereinbefore described, except that the automatic features have been omitted, and the base plate 15 reduced in size accordingly. Since the stops provided in the automatic construction by the upturned portion 60 of the base plate have been removed, other stops, such, as for instance, two pins or lugs 107 are arranged rigid with the base plate 15 and upon opposite sides of the inner end of the hand-lever 48, to limit the motion of movement of the hand-lever. It is thought that a further detailed description of the construction and mode of operation of this modified form of the invention is not necessary, as all of the parts are numbered and have been fully described hereinbefore in describing the automatic form of the brake.

In Figs. 9 and 10 is shown a modified construction for imparting motion from the swinging tone arm 10 to the mechanism for releasing the brake automatically. This mechanism is similar to that illustrated in Figs. 2 and 7 of the drawings, but in this form of the device, the fingers 89' and 90' of the arm 88' are arranged substantially vertical instead of horizontal, and are mounted firmly upon the rock-shaft 20. In this form of the device, a disk 107' is securely fastened or attached to the rock-shaft 20, as by a pin 108', extending through a flange or hub 109' on said disk 107', and through said rock-shaft 20. Adjacent this disk 107', which is provided with a plane face, is arranged the friction washer 91' loose on the shaft 20, and adjacent this washer 91' is the arm 88', also loose on the shaft 20. Adjacent and beyond said arm 88' is the other washer 92', which is clamped or pressed against the arm 88' by the arms 95' of the yielding spider 94', which, in turn, may be held in a predetermined position by a nut 96' threaded over the end of the rock-shaft 20, and prevented from accidental turning or displacement in any suitable manner, as by a check-nut 110'.

In applying this invention, it is obvious that various modifications might be made to meet various conditions, that many changes might be made in the constructions hereinbefore described, and that the improved brake forming the subject-matter of this application might be used in connection with various other machines besides the talking machine, any or all of which being possible without departing from the spirit of this invention or the scope of the appended claims.

Having thus fully described this invention, I claim and desire to protect by Letters Patent of the United States:

1. A brake comprising frictional stopping means, means for moving said stopping means into initial operative position, and means cooperating with said second men-

tioned means for automatically and gradually applying the braking pressure of said stopping means after it has reached said position.

2. A brake comprising frictional stopping means, means for moving said stopping means into an initial operative position, said means including a toggle joint, and yielding means surrounding one member of said joint for automatically applying the braking pressure of said stopping means after it has reached said position.

3. A brake comprising a frictional brake member, yielding means for moving said brake member into initial operative position, and means actuated by said yielding means to modify the braking pressure of said brake member after it has reached its initial braking position.

4. A brake comprising a frictional brake member, yielding actuating means for moving said brake member into initial operative position, and secondary yielding means actuated by said first mentioned yielding means for modifying the pressure of said brake member after it has reached said initial position.

5. A brake comprising two links connected to form a toggle joint, a brake-shoe carried by one of said links, a spiral spring surrounding the other of said links, said other link being longitudinally movable, and means for actuating said joint to apply said brake-shoe, said spring being arranged to be compressed by the movement of said toggle joint after said shoe has been applied, to gradually apply the braking pressure of said shoe.

6. A brake comprising a brake member, a catch to hold said brake member in inoperative position, and means restrained to swing in a fixed plane only, to release said brake member from inoperative position, said means being movable also to return said brake member to an inoperative position, where it will be retained by said catch.

7. A brake, comprising an actuating lever pivoted on a fixed axis intermediate of its ends, a secondary lever pivoted coaxially with said actuating lever, a brake member operatively connected to said secondary lever, a yielding catch adapted to engage said secondary lever to hold said brake member in inoperative position, and means for automatically actuating said secondary lever when released to apply said brake member, said actuating lever being operable to release said secondary lever from said catch, and also to return said secondary lever into inoperative position, where it will be automatically retained by said catch.

8. A brake comprising an actuating lever pivoted intermediate of its ends on a fixed axis, an arm pivoted coaxially with said

lever, a brake member operatively connected to said arm, a link pivoted to said arm, a second link, a pivot connecting said links to substantially form a toggle joint, a bearing in which said second link is slidable substantially longitudinally, yielding means acting longitudinally of said second link for controlling the movement thereof, and an intermediate link having one end operatively connected to said toggle joint and its other end operatively connected to said actuating lever.

9. A brake, comprising an actuating lever, a secondary lever cooperating with said actuating lever, a brake-shoe, a catch arranged to engage said secondary lever to hold said shoe in inoperative position, and means for automatically actuating said secondary lever when released to apply said brake-shoe, said actuating lever being operable to release said secondary lever from said catch, and also to return said secondary lever into inoperative position, where it will be retained by said catch.

10. A brake mechanism comprising a toggle joint consisting of two relatively movable links and a pivot connecting said links, a brake-shoe operatively connected to one of said links, a stationary support for the other of said links, yielding means acting on said stationary means and on said other of said links tending to move said pivot of said toggle joint away from said support, and means acting on said pivot of said toggle to bring said shoe into braking position, said yielding means acting on said shoe after said shoe is in braking position to gradually apply the brake pressure on said shoe.

11. A brake comprising two links connected to form a toggle joint, a brake shoe operatively connected to one of said links, yielding means surrounding the other of said links for exerting a pressure longitudinally thereof, said latter link being longitudinally movable, and means for substantially straightening said joint to apply said brake shoe.

12. A brake comprising frictional stopping means, a catch for holding said stopping means in inoperative position, means for moving said stopping means into initial operative position upon the release of said catch, and means actuated by said second mentioned means for gradually modifying the brake pressure of said stopping means after it has reached said initial operative position.

13. A brake comprising a brake-shoe, a catch to hold said brake-shoe in inoperative position, and means having a limited free movement independent of said brake-shoe to operate said catch to release said shoe from inoperative position, said means being mov-

able also to return said brake-shoe to an inoperative position in which it is automatically engaged by said catch.

14. In a brake mechanism, the combination with a rotary element, of a brake-shoe arranged to engage said element, means for moving said brake-shoe into engagement with said element, and resilient means compressed by the movement of said first mentioned means and acting to gradually apply the pressure of said brake-shoe against said element after said brake-shoe has been brought into engagement with said element.

15. A brake comprising two links connected to form a toggle joint, a brake-shoe operatively connected to one of said links, a bearing for the other of said links, yielding means acting on said other link and tending to hold said toggle in its broken position, and means to straighten said toggle against the action of said yielding means to bring said shoe into braking position.

16. In a brake, the combination of a brake member, a movable element operatively connected to said brake member, means acting on said element for moving said brake member to an operative position, means, including a catch element, for holding said brake member in an inoperative position, one of said elements being provided with a slot having a recess providing an internal shoulder, and the other of said elements coöperating with said slot and being engaged by said shoulder to hold the brake member in an inoperative position, and means for operating said catch element to release the brake member.

17. A brake comprising a brake member, a catch to hold said brake member in inoperative position, means to release said brake from inoperative position, said means being movable also to return said brake member to an inoperative position in which it is retained by said catch, and means to release said catch independent of said first-mentioned means.

18. A brake comprising an actuating lever,

a secondary lever coöperating with said actuating lever, a brake shoe, a catch arranged to engage said secondary lever to hold said shoe in inoperative position, means for automatically actuating said secondary lever when released to apply said brake shoe, said actuating lever being operable to release said secondary lever from said catch and also to return said secondary lever into inoperative position where it will be retained by said catch, and means to release said secondary lever from said catch independently of said actuating lever.

19. A brake comprising a brake shoe, a catch to hold said brake shoe in inoperative position, means having a limited free movement independent of said brake shoe to operate said catch to release said shoe from inoperative position, said means being movable also to return said brake shoe to an inoperative position in which it is automatically engaged by said catch, and means independent of said first-mentioned means to operate said catch to release said shoe from inoperative position.

20. In a brake mechanism, the combination of a movable brake member, an actuating lever pivoted upon a fixed axis, a secondary lever pivoted upon a fixed axis, said actuating lever being provided with a slot, means movable in said slot and operatively connected to said secondary lever for actuating said brake member, a yielding catch adapted to engage said secondary lever to hold said brake member in inoperative position, and means for actuating said secondary lever when released from said catch, the slot in said actuating member permitting a limited movement of said actuating lever with respect to said secondary lever to release said catch from said secondary lever.

In witness whereof, I have hereunto set my hand this 27th day of July, A. D., 1911.

WILBURN N. DENNISON.

Witnesses:

FRANK B. MIDDLETON, Jr.,
CHARLES F. WILLARD.

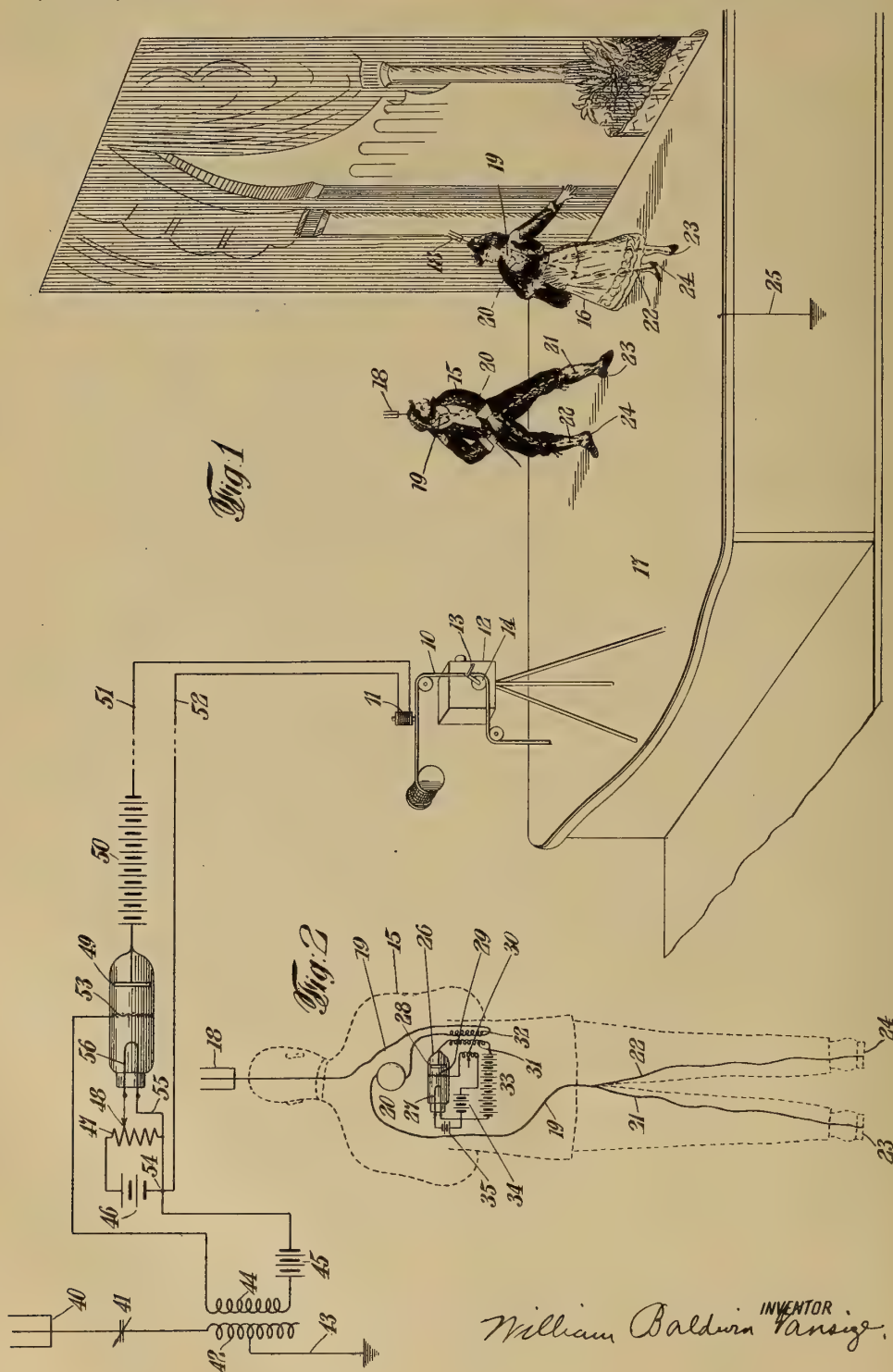
RECORDING CORRELATED LIGHT AND SOUND
EFFECTS.

#1,219,682-----W.B.Vansize,
Patented-March 20th, 1917.
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W. B. VANSIZE.
 RECORDING CORRELATED LIGHT AND SOUND EFFECTS.
 APPLICATION FILED SEPT. 24, 1915.

1,219,682.

Patented Mar. 20, 1917.



William Baldwin Vansize, INVENTOR.

UNITED STATES PATENT OFFICE.

WILLIAM BALDWIN VANSIZE, OF BROOKLYN, NEW YORK.

RECORDING CORRELATED LIGHT AND SOUND EFFECTS.

1,219,682.

Specification of Letters Patent.

Patented Mar. 20, 1917.

Original application filed June 29, 1915, Serial No. 36,938. Divided and this application filed September 24, 1915. Serial No. 52,353.

To all whom it may concern:

Be it known that I, WILLIAM B. VANSIZE, a citizen of the United States, residing in Brooklyn, in the city of New York, county of Kings, State of New York, have invented certain new and useful Improvements in Recording Correlated Light and Sound Effects, of which the following is a specification.

This application is a division of my application Serial No. 36,938, filed June 29, 1915.

This invention relates to recording light and sound effects which are correlated in time and significance, and the object of the invention is to record, in moving-picture form, as on a film, photographically, certain moving objects or individuals, and at the same time record on a sound-record medium any intelligible sounds, whether purely vocal or purely musical, or both, due to said objects. This is done by placing on each moving object independent means for transmitting sound through the natural medium, or Hertzian waves, thus making each object absolutely independent of circuit connections or contacts, with respect to fixed points or circuits. The apparatus employed includes telephonic wireless transmitting and recording devices, and the means employed for recording the sound is preferably a wire of hardened magnetic metal, like steel, of small diameter; this wire is magnetized by the free pole of an electro-magnet, the coil of which magnet is subjected to electro-magnetic waves transmitted through the natural medium; by natural medium is meant the ether surrounding the earth, which Hertz demonstrated to be a natural medium subject to electro-magnetic influences, and it is here intended to include all the various means by which wireless signaling is and has been accomplished. To produce these electro-magnetic waves, each object photographed, and emitting sounds, is equipped with a portable telephonic wireless transmitting apparatus. By this it is meant to include a generator of high frequency oscillations, and a means for inflecting the oscillations with variations due to sound waves, like a telephone transmitter of the microphone species. It is preferable to employ, as a part of this apparatus, a vacuum valve adapted for transmitting high frequency oscillations; this valve, in addition to the usual hot element and

cold element, preferably has a third element adapted to form the terminal of a circuit and influence or control the electrical condition of the space between the two said elements; this may be like a grid, located within the vacuum between the hot element and the cold element; also there is a battery having an electro-motive force of about one hundred volts, each cell is of diminutive form and light weight, of the Planté or Faure type, and fifty such cells, arranged in series, should supply about one hundred volts; these cells are connected between the hot element and the cold element; the telephone transmitter is included in or associated with the radiating circuit and supported upon the chest of the object or individual. There is a battery for heating the filament in the vacuum, and when this battery is adjusted to produce a certain degree of heat and the battery and the circuit connecting the hot and cold element is tuned and so adjusted as to cause the valve to oscillate, the variation of voice waves or sound waves due to the microphone transmitter will inflect the resulting oscillatory discharge, and as these oscillations are radiated, there results a corresponding wave motion in the ether, as well known. The recording magnet for the sound recorder is connected in circuit with a vacuum detector or valve, as above described, adjusted for the reception and detection of oscillations, and the valve is associated with the receiving antenna. The antenna at the transmitting station or object, if used, is, preferably, in the form of a wire of practically invisible dimensions and color, and projects a foot or two above the object. The lower end of this antenna terminates in contacts and these contacts are adapted to engage a sheet-metal floor or capacity. These contacts are preferably placed in the soles of the shoes of the individual. The picture record and the sound-record medium or wire are advanced at a predetermined rate, and the two records are made simultaneously, in the identical correlation in which they occur. The sound-record medium or wire is coiled upon a spool and may be, in length, coextensive with the picture film.

In the arrangement of apparatus for recording the sounds due to the several different objects or actors, in order to make effective use of Hertzian oscillations, a re-

ceiving and repeating station is preferably located from one-quarter to one-half wave length from the transmitter, that is, say, outside the inclosure or hall and from 1200 to 2000 feet distant from the transmitters; the transmitted sound variations are there received, at this station, by a valve detector, such as has been described. A wire circuit, preferably a complete metallic circuit, is extended back to the point where the sound record, in close proximity to the picture record, is to be made. The valve detector is preferably connected as a form or species of repeater or relay between this last-named circuit and the radio receiving circuit. This separated station is used so as to provide for changes in position and movement by the moving object, the extent of movement, ordinarily, of the object being but a small part of the entire distance separating the object from the receiving station. If this provision were not made, re-tuning or re-adjustment of the apparatus carried by the object or individual, as said object moves about, would be necessary at frequent intervals.

The accompanying drawings illustrate the invention.

Figure 1 shows apparatus employed in recording the movement and vocalization of two objects or individuals on a stage. Fig. 2 shows, in dotted outline and detail, the transmitting apparatus carried by each individual.

In Fig. 1 the movements and utterances of two objects or individuals, 15 and 16, are shown on a stage; this stage has a metal or conducting surface or floor, 17, connected to earth as shown at 25. Each object, 15, 16, may be provided with a wire or antenna, 18, projecting slightly above the head. This is formed of small-gage wire and given a color which will not photograph effectively, the object being to avoid its representation in the picture; the antenna, 18, is connected in the circuit, 19, containing an inductance, 32, utilized as the secondary of an induction coil in series with a microphone or current-varying telephone transmitter, 20, carried on the chest of the individual, so that chest vibrations are effective to control the telephonic transmission by transmitter 20. The wire 19 is bifurcated and continued in two divisions, 21 and 22, to contacts, 23 and 24, placed in the bottom of the shoe of the individual, so as to make contact with the metal floor, 17. In addition to the circuits described, there is carried by the individual a vacuum valve, 26, having a hot element, 27, and a cold element, 28, with an intermediate grid, 29; the hot element 27 is heated by a small dry battery, 35. A battery, 33, of, say, fifty secondary elements of small size and weight, preferably one or two ounces per cell, is connected in circuit between the cold element 28 and the hot element 27. In

this circuit is an inductance, 31, employed as the primary of an induction coil, and inductively associated with the secondary, 32. The third or grid element, 29, is in circuit with six cells of battery, 34, connected to the hot element, and including an inductance, 30, inductively associated with the coil, 31. The inductance 30 is adjustable and, when properly adjusted, the local circuits described, including the valve, constitute a generator of high-frequency oscillations. On the stage, I have shown a tripod supporting a camera, with a crank handle, 13; this crank 13, when rotated clockwise, advances the transparent film of sensitized surface upon which the photographic record is made, as is well known. The camera is shown at 12. The sound-record medium is a tape of steel or a steel wire, like piano-string wire, shown at 10. A supply of this wire is carried on a spool and passes around a series of pulleys, including a grooved pulley, 14, on shaft with crank 13, so that when the film is advanced by turning the crank 13 the sound-record medium 10 is advanced with it or in predetermined relation, as may be determined by varying the size of the pulley on the shaft of crank 13. A magnet having a small pole-piece is shown at 11; this is in the circuit 51, 52, with battery 50, terminating in the hot and cold elements 49 and 56 of a vacuum valve. At a point from one-quarter to one-half wave length distant from the stage 17 there is erected any well-known form of wireless antenna, 40; included in its circuit is an adjustable condenser, 41, an inductance, 42, of adjustable character, and a ground connection, 43. Inductance 42 is employed as the primary of an inductorium, the secondary of which, in inductance form, is shown at 44, in circuit with a battery, 45, in a circuit one terminal of which is connected to the grid, 53; the other terminal is connected to the hot element 56 at 54, 55. The battery for heating the element 56 is shown at 46, and a variable resistance, 47, with an adjustable contact, 48, provides for adjusting the heating capacity of the battery and the heat of the filament 56. It is to be noted that the sounds emitted by the objects 15 and 16 are telephonically transmitted, by means of the microphone-transmitter 20, and the high-frequency generator carried upon the person, as shown in Fig. 2, by radio-signals or Hertzian waves, to the antenna 40, and are repeated back to the valve and the metallic circuit 51, 52, to the sound-recording magnet 11, where the sounds are recorded on the wire 10, while a visible record is photographically made upon the film of the camera 12 in correlated order.

All batteries shown in connection with the vacuum valves are to be adjustable as regards electro-motive force.

It is intended to include in the term "natural medium" used in the claims, the space separating the transmitting and recording station only and Hertzian waves and any magnetic or electro-magnetic waves, or influence of an intangible nature, operating through said space, and where wire or material of a conducting nature does not form a complete circuit.

What I claim is:

1. The combination of a photographic recorder, including a moving record medium, a phonographic record medium moving with said record medium, means for phonographically recording sound waves, including an electromagnet, a telephone transmitter located on an animate moving object, and means whereby said transmitter controls said electro-magnet, including the natural medium in the space separating the transmitting and recording points, and circuit connections for said magnet.

2. The combination, in a correlated photographic and phonographic recorder, of two characteristic record mediums moving in predetermined relation, a recording magnet for the phonographic recorder, forming part of a wireless receiving apparatus, and a wireless transmitting apparatus controlled by and moving with the moving object photographed.

3. The combination, in a correlated photographic and phonographic recorder, of two characteristic record mediums moving in predetermined relation, a recording magnet for the phonographic recorder, forming part of a wireless receiving apparatus, and a series of independent, wireless sound-wave transmitting devices, carried by a series of independently moving objects, respectively.

4. Apparatus for recording photographically and phonographically correlated optical and audible effects, due to a moving object, consisting of the combination of a moving photographic record medium, a lens therefor, a moving phonographic record medium, means for advancing said mediums in predetermined relation, means for recording sounds, including an electro-magnet, a telephone transmitter carried by the moving object photographed, and means whereby said transmitter controls said magnet through the natural medium in the space separating the transmitting and recording points or stations.

5. In apparatus for recording correlated, optical and audible effects due to a plurality of independently moving objects, the combination of a moving-picture record medium, a lens therefor, a moving sound-record medium, a recording magnet therefor, means for moving said record mediums in predetermined relation, a plurality of independent telephone transmitters, one car-

ried by each moving object photographed, and means including the natural medium in the space separating the transmitting and recording points or stations whereby said transmitters jointly and severally control said magnet.

6. In apparatus for recording correlated light and sound effects due to a moving object, the combination of record mediums, one for each species of record, means for advancing said record mediums, a photographic recording apparatus, a sound-recording device, a sound-transmitting apparatus carried by the object operating through the natural medium in the space separating the transmitting and recording points or stations, a repeater located at a station at least one-quarter wave length distant from said recording device, and a local circuit containing a sound-recording magnet located at the recording device.

7. In recording apparatus for correlated light and sound effects, the combination of a photographic record medium, a sound record medium, means for advancing both records, a magnet for recording sound waves, a wireless telephone transmitting apparatus carried by an animate, moving object, a wireless receiving device at a separated point and means whereby said transmitter controls said magnet.

8. In a recording apparatus for correlated light and sound effects, the combination of a photographic record medium, a sound record medium, means for advancing both record mediums, means for recording sound waves, wireless telephone transmitting apparatus carried by an animate, moving object, and a wireless receiving device to control the sound recording means.

9. The combination of photographic recording apparatus, including a moving picture record medium, a moving, independent sound record medium, means for advancing said mediums in predetermined relation and a sound recording device, with wireless telephonic transmitting apparatus carried by an animate, moving object, the movements and sounds due to which object are to be recorded.

10. The combination of a record medium for light effects, a record medium for sound effects, means for recording upon said mediums, simultaneously, light and sound effects due to a moving, animate object, a wireless detector adapted to control the sound record and a wireless sound-transmitting apparatus carried by said object.

11. The combination, with recording apparatus for correlated light and sound variations, of wireless sound-transmitting apparatus carried by an animate, moving object and a wireless detector adapted to control the sound-recording apparatus.

12. In recording apparatus for correlated

light and sound effects, the combination of a moving, photographic recording apparatus, a moving sound recording apparatus, means for advancing both record mediums in pre-
5 determined relation, wireless telephonic transmitting apparatus carried by an animate, moving object, the movements and sounds due to which are to be recorded, a
10 wireless receiving device at a separated point, and means whereby said transmitting

apparatus controls said receiving device and said receiving device controls said sound recording apparatus.

In testimony whereof I have signed my name in the presence of two subscribing witnesses. 15

WILLIAM BALDWIN VANSIZE.

Witnesses:

JOHN C. SANDERS,

J. ANDREW WHITE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

GRAPHOPHONE,

#1,219,752-----Phillip Majorana,
Patented-March 20th, 1917.
Filed-March 30th, 1916.

P. MAJORANA.
GRAPHOPHONE.

APPLICATION FILED MAR. 30, 1916.

Patented Mar. 20, 1917.

2 SHEETS—SHEET 1.

1,219,752.

Fig-1

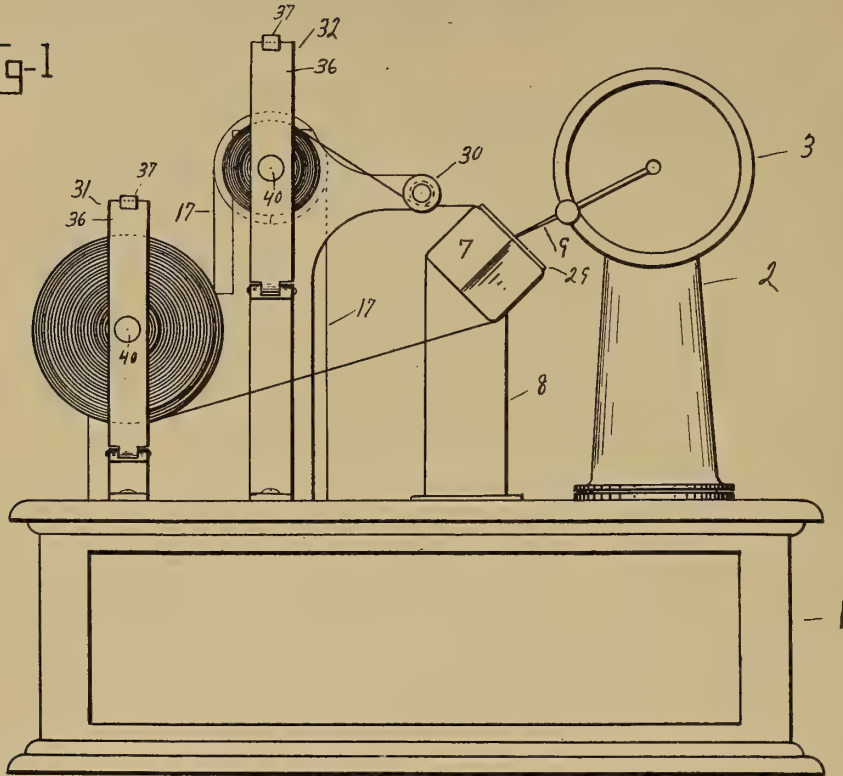
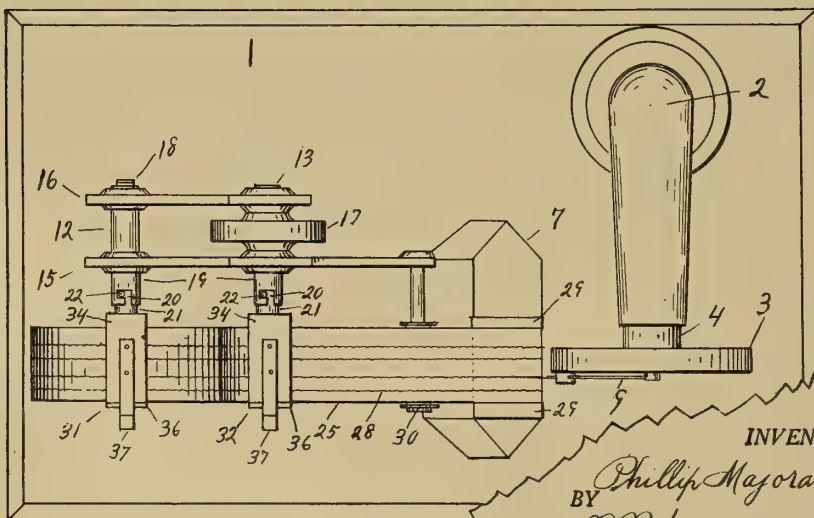


Fig-2



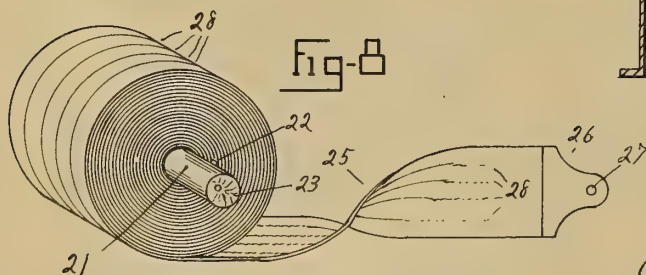
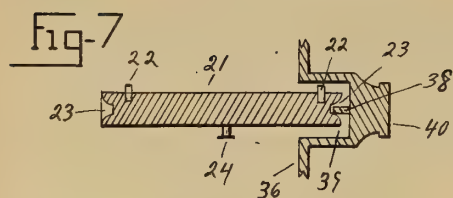
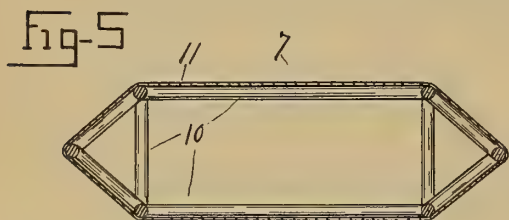
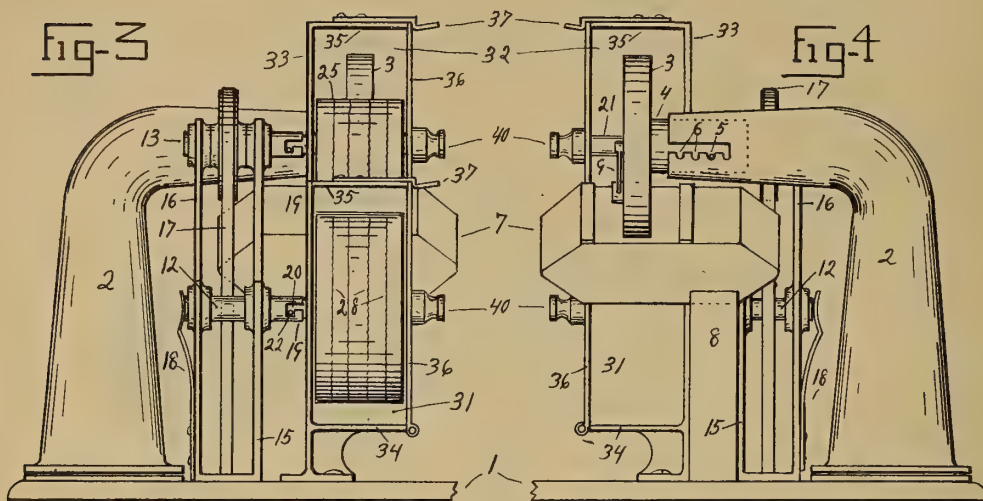
INVENTOR.

BY *Phillip Majorana*
W. B. Munnell
ATTORNEY

1,219,752.

P. MAJORANA.
GRAPHOPHONE.
APPLICATION FILED MAR. 30, 1916.

Patented Mar. 20, 1917.
2 SHEETS—SHEET 2.



INVENTOR.
Phillip Majorana
BY
W. B. Munnell
ATTORNEY

UNITED STATES PATENT OFFICE.

PHILLIP MAJORANA, OF LOUISVILLE, KENTUCKY.

GRAPHOPHONE.

1,219,752.

Specification of Letters Patent.

Patented Mar. 20, 1917.

Application filed March 30, 1916. Serial No. 87,712.

To all whom it may concern:

Be it known that I, PHILLIP MAJORANA, a subject of the King of Italy, and residing at Louisville, county of Jefferson, and State of Kentucky, have invented certain new and useful Improvements in Graphophones, of which the following is a specification.

This invention relates to an instrument for reproducing sounds through the medium of a record impressed on a tape or ribbon.

Sound reproducing machines now in general use, utilizing cylinder, or disk records, can play but a limited time, two to four minutes, their bulk prohibiting the use of larger records.

An object of this invention is to provide an instrument, and a record therefor, which will play for an extended period of time.

Another object is the provision of an instrument having a resonance chamber underlying the record at the point where the reproducing stylus contacts with the record.

A further object is the provision of a record bearing medium comprising a rectilinear strip having a plurality of records indented on each side thereof.

With the foregoing and other objects in view, which will appear as the description progresses, the invention consists of the novel construction and arrangement of parts set forth, and illustrated in the accompanying drawings which form a part of this specification, wherein is set forth an embodiment of the invention, but it is to be understood that such changes, modifications and variations may be resorted to as come within the scope of the claims appended hereunto.

Referring to the drawing, wherein similar reference characters designate like parts in the several views, Figure 1, is a front elevation of an embodiment of the invention: Fig. 2, a plan: Figs. 3, and 4 are respectively end views: Fig. 5, a central longitudinal section of the resonance box: Fig. 6, a transverse section of the resonance box: Fig. 7, a longitudinal central section of the spindle and associated bearing: Fig. 8, a perspective view of the record ribbon.

Referring now more in detail to the drawings, the reference character —1— designates a cabinet, which may be of any desired design, or construction. Upon the cabinet a

tone arm —2— is erected which carries a sound box —3—. The sound box is connected with the tone arm by means of a sliding sleeve —4— which may be moved in and out, to adjust the sound box in different positions, it being maintained in adjusted position by means of a pin —5—, on the sleeve, which engages in notches —6— on the tone arm. A resonator —7— is erected on and extended laterally from the top of a vertical hollow column —8— which is erected on the cabinet in proximity to the tone arm, and in such relation thereto that the needle —9— of the sound box will rest on the resonator. The resonator is preferably a skeleton frame —10—, secured to and in communication with the interior of the column 8, and is covered with a suitable membrane, or skin —11—. As illustrated, the resonator is rectangular in cross section and inclined on its longitudinal axis at a suitable angle to the horizontal. Shafts —12 and 13— are suitably journaled in a frame comprising front and back plates —15 and 16—. Rotative movement is imparted to one of the shafts as 13, by any suitable means, such as a belt —17— which leads to a suitable source of motive power, usually a spring or electric motor located in the cabinet. A suitable friction device, such as a spring —18—, bears on the other shaft 12 and serves to steady the movement thereof. The shafts 12 and 13 extend forward a suitable distance from the frame and are provided on the ends thereof, with suitable coupling devices, such as sockets —19— which have bayonet slots —20—, for the reception of spindles —21—. The spindles are adapted to fit in the sockets 19, and are provided at each end with a radial pin —22— adapted to be engaged in the slots 20. The spindles are also provided with axial depressions —23—, in each end for the reception of a pivot bearing, to be hereinafter described. The spindles are also provided, intermediate their length, with suitable means, such as a pin —24—, for the attachment thereto of a band, ribbon or tape —25— of suitable material, such as celluloid, by means such as a tab, —26—, secured to each end of the band and having an eye —27— adapted to be engaged over the pin 24. The band has impressed, or indented,

on either or both surfaces, a plurality of parallel, longitudinal record grooves —28—. Normally a record band is wound about a spindle (see Fig. 8) and is handled, transported and stored in that shape. In operation a record roll would be connected with the primary, or free shaft, as 12, by inserting an end of the projecting spindle in the socket 19, and giving it a slight turn to engage the pin 22 in the slot 20. A portion of the band is then drawn off, passed about the resonator, resting thereon between guides —29—, under a guide roll —30— and the end tab attached to a spindle which has been inserted in the socket of the accumulator shaft 13. The sound box 3 is then adjusted, by sliding it in or out of the tone arm 2, to adjust the needle 9, in the desired record groove. Compartments, or magazines —31, and 32— are positioned respectively in front of the shafts 12 and 13 to accommodate the record roll. As illustrated these magazines comprise rear vertical members, or bars —33—, with upper and lower lateral arms —34— and —35— extending forward therefrom a distance substantially the same as the width of the record roll. To one of these arms, as 35, a gate —36— is hingedly connected and is adapted to be engaged with, and held in closed position, by a latch —37—, on the other arm. Intermediate the length of each gate, is a pivot —38—, which is positioned in a depression —39—, co-axially with the respective shafts. This pivot 38 is adapted to engage the bearings 23 in the outer ends of the spindles. It is obvious that the bars 33, arms 34 and 35, and gates 36 may be developed, or extended, to completely inclose the record roll. When a record has been played, the record band accumulated on a roll in the receiving chamber, may be removed and placed in a suitable repository, or it may be placed on the primary shaft and connected up as previously described, in order to play a record on the opposite surface. The records run in opposite directions on each side, thus avoiding the necessity of rewinding a roll before it can be used again.

Having thus described my invention so that anyone skilled in the art pertaining thereto may make and use the same, I claim:

1. In apparatus of the character described, a frame, a shaft mounted in and extending therefrom and provided with a socket in the extended end thereof, having a bayonet slot, a spindle adapted to fit in said socket, radial pins on the spindle adapted to be engaged in said slots, and a gate provided with a bearing adapted to receive the outer end of the spindle.

2. In a device of the character described, a frame, a shaft rotatably mounted in and extended from said frame, said shaft pro-

vided with a socket on its extended end, a receptacle positioned before said frame and having an aperture in alinement with the shaft, a spindle adapted to be projected through said aperture and engaged in said socket, and a closure for said receptacle provided with a bearing adapted to receive the free end of said spindle.

3. In a device of the character described, a frame, a shaft rotatably mounted therein and extending therefrom, said shaft provided on its extended end with a socket having a bayonet slot, a receptacle positioned before said frame and having an aperture in its rear wall in alinement with the shaft, a reversible spindle adapted to be projected through said aperture and entered in said socket, a radial pin near each end of said spindle adapted to be engaged in said bayonet slot, a closure for said receptacle provided with a bearing adapted to receive the free end of the spindle.

4. In a device of the character described, a frame, a shaft rotatably mounted therein and extending therefrom, said shaft provided on its extended end with a socket having a bayonet slot, a receptacle positioned before said frame and having an aperture in its rear wall in alinement with said shaft, a reversible spindle adapted to be projected through said aperture and entered in said socket, said spindle having a bearing in each end thereof, a radial pin near each end of the spindle adapted to be engaged in said bayonet slot, a closure for said receptacle having a recess adapted to receive the free end of the spindle and a pivot bearing in said recess adapted to enter the bearing in the end of the spindle.

5. In a device of the character described, a frame, a pair of shafts rotatably mounted therein and extending therefrom, each of said shafts being provided on its extended end with a socket having a bayonet slot, means for rotating one of said shafts, a receptacle positioned before said frame and having apertures in its rear wall in alinement with said shafts, reversible spindles adapted to be projected through said apertures and entered in said sockets, a radial pin near each end of said spindles adapted to be engaged in said bayonet slots, closures for said receptacle provided with bearings adapted to receive the free ends of the spindles.

6. In a device of the character described a frame, a pair of shafts rotatably mounted therein and extending therefrom, each of said shafts provided on its extended end with a socket having a bayonet slot, a receptacle positioned before said frame and having apertures in its rear wall in alinement with said shafts, reversible spindles

adapted to be projected through said apertures and entered in said sockets, said spindles each having a bearing in each end thereof, said pins being adapted to be engaged in the bayonet slots, a closure for said receptacle having recesses adapted to receive the free ends of the spindles, a pivot bearing in each recess adapted to enter the bearing in the end of the spindles, and means for rotating one of the shafts.

PHILLIP MAJORANA.

Witnesses:

S. DENUNZIO,
PHIL PINTO.

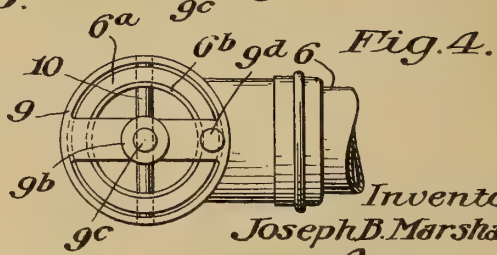
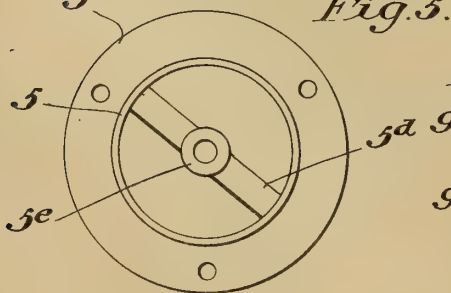
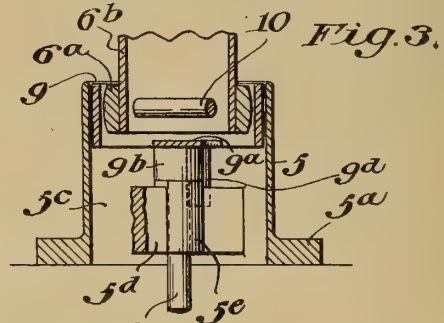
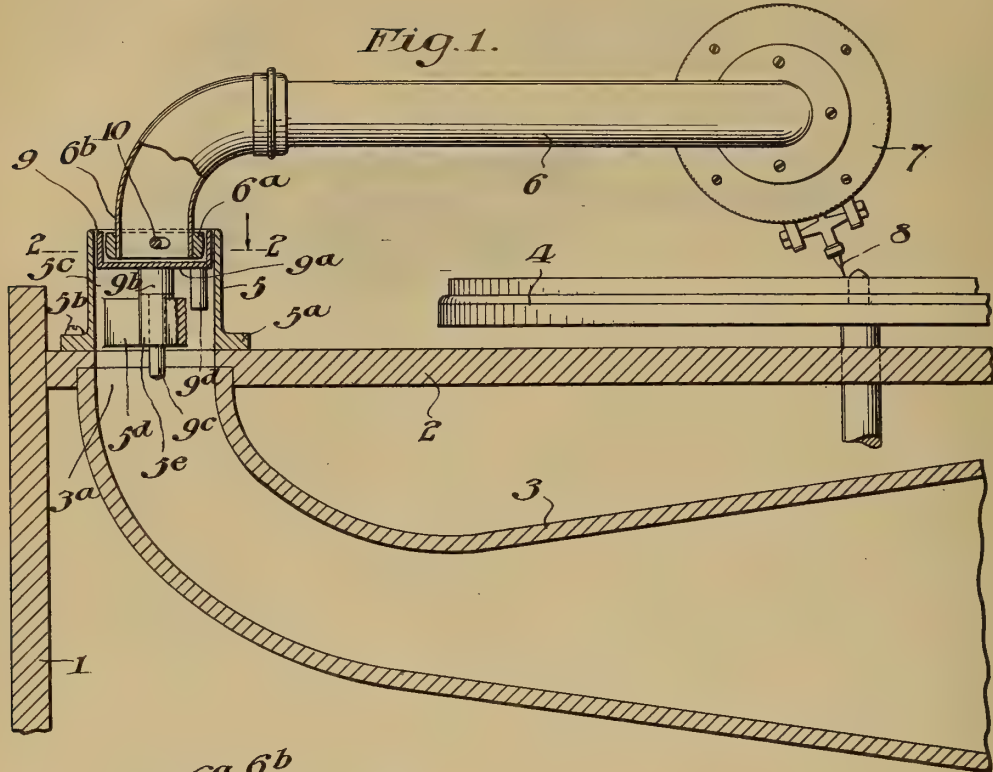
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

TALKING-MACHINE,
#1,219,753-----Joseph B. Marshall,
Patented-March 20th, 1917.
Filed-February 8th, 1916.

J. B. MARSHALL.
TALKING MACHINE.
APPLICATION FILED FEB. 8, 1916.

1,219,753.

Patented Mar. 20, 1917.



Inventor:
Joseph B. Marshall,
By C. N. Butler
Attorney.

UNITED STATES PATENT OFFICE.

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TALKING-MACHINE.

1,219,753.

Specification of Letters Patent.

Patented Mar. 20, 1917.

Application filed February 8, 1916. Serial No. 76,928.

To all whom it may concern:

Be it known that I, JOSEPH B. MARSHALL, a citizen of the United States, residing in the city of Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain Improvements in Talking-Machines, of which the following is a specification.

This improvement in talking machines relates more particularly to the means for supporting and connecting the tone arm so as to secure the desired limited lateral and vertical oscillatory movement thereof in a simple, convenient and efficient manner.

In the accompanying drawings, Figure 1 is a broken sectional side elevation of a part of a talking machine embodying my improvements; Fig. 2 is a sectional side view taken on the line 2—2 of Fig. 1; Fig. 3 is an irregular vertical sectional view taken through the parts shown in Fig. 2; Fig. 4 is a bottom plan view of the parts of my improvement directly connected with the tone arm, and Fig. 5 is a top plan view of the tone arm supporting device to be fixed on the deck of the machine.

My improvements, as illustrated in the drawings, are embodied in a talking machine comprising a case 1, containing the deck 2, the horn 3, and the turn-table 4, of usual character.

A tubular supporting device 5 is provided with the base flange 5^a, which is fixed to the deck by screws 5^b and contains the sound passage 5^c, which registers with the mouth 3^a of the horn, the support containing the cross-piece 5^d which is provided with the vertical bearing 5^e.

The tone arm 6, having the sound box 7 and stylus mechanism 8 connected with its forward end, is provided with a ring or collar 6^a which is fixed on the extremity of the downward extending elbow 6^b at the rear end of the tone arm, and this collar or ring is disposed concentrically within a ring or collar 9, which is disposed within the tubular support 5; a pin 10 extending through the parts 6^a, 6^b, and 9, whereby the

tone arm is pivotally supported so that it can oscillate in a vertical plane.

The ring 9 is provided with a bottom cross piece or bar 9^a which extends in the general direction of the tone arm, with a bearing 9^b which is adapted to rest on the top of the bearing 5^e, and with a vertical spindle 9^c which slips through and revolves in the bearing 5^e.

The part 9 has a downwardly extending stud 9^d which is fixed to the part 9^a and adapted to make contact, at the extremities of its oscillatory movement, with the part 5^d.

The horizontal movement of the tone arm is therefore limited by the engagement of the stud 9^d with the cross-bar 5^d at each extremity of the arc of oscillation, and the vertical movement of the tone arm is limited to a definite arc by the contact of the part 6^a with the part 9^a.

Having described my invention, I claim:

1. In a talking machine, the combination of a hollow support provided with a cross piece, a ring adapted to turn on said cross piece about a vertical axis, a projection on said ring adapted for engaging said cross piece to limit the movement of said ring, and a tone arm connected to said ring so as to oscillate on a horizontal axis, said ring and tone arm having means for limiting the oscillatory movement of the latter.

2. In a talking machine, the combination with the machine deck and horn, of a hollow member fixed on said deck in communication with said horn, said member containing a cross piece, provided with a vertical bearing, a ring adapted to oscillate about a vertical axis within said member, said ring containing a cross piece provided with a vertical bearing coacting with said cross piece and bearing first named, and a tone arm having an end thereof journaled within said ring on a horizontal axis.

3. In a talking machine, the combination with a machine deck and horn, of a vertically disposed hollow member fixed to said deck in communication with said horn,

said member containing a cross piece provided with a vertical spindle bearing, a ring journaled within said member on said cross piece, said ring having a cross piece 5 and a spindle thereon journaled in said bearing, a stud on said ring and adapted for engaging said cross piece first named to limit the oscillatory movement of said ring, and a tone arm having an end thereof journaled in said ring on the horizontal 10 bearing means.

In testimony whereof, I have hereunto set my name this 27 day of January, 1916.
J. B. MARSHALL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

ATTACHMENT FOR PHONOGRAPHIC
REPRODUCERS.

#1,219,934-----Edmund Gollmer,
Patented-March 20th, 1917.
Filed-June 30th, 1915.

E. GOLLMER.
ATTACHMENT FOR PHONOGRAPHIC REPRODUCERS.
APPLICATION FILED JUNE 30, 1915.

1,219,934.

Patented Mar. 20, 1917.

Fig. 1.

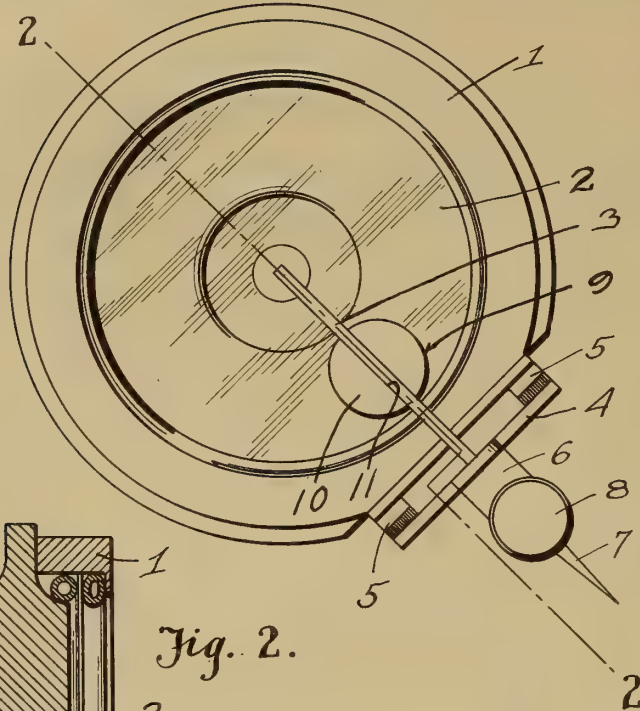


Fig. 2.

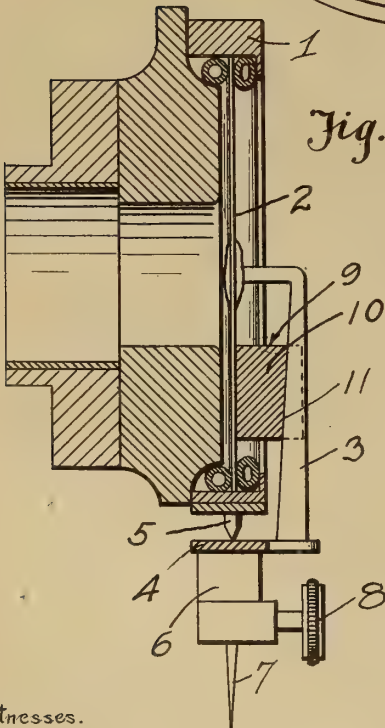
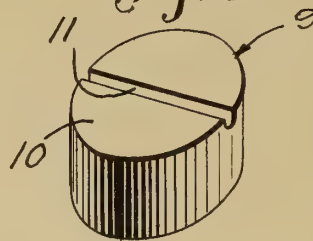


Fig. 3.



Witnesses.

J. O. Strahler.
H. B. Layton

Inventor

E. Gollmer.

By

C. A. Murphy, Jr.

Attorney

UNITED STATES PATENT OFFICE.

EDMUND GOLLMER, OF NEW ULM, TEXAS.

ATTACHMENT FOR PHONOGRAPHIC REPRODUCERS.

1,219,934.

Specification of Letters Patent.

Patented Mar. 20, 1917.

Application filed June 30, 1915. Serial No. 37,301.

To all whom it may concern:

Be it known that I, EDMUND GOLLMER, a citizen of the United States, residing at New Ulm, in the county of Austin and State of Texas, have invented certain new and useful Improvements in Attachments for Phonographic Reproducers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to new and useful improvements in attachments for phonographic reproducers and the principal object of the invention is to provide a damper adapted to be applied to reproducers to eliminate the crackling and grinding noises usually accompanying the use of such instruments.

Another object of the invention is to provide a device which will effectively bring out the tones accurately and clearly and which will eliminate other disturbing noises.

A further object of the invention is to provide an attachment which may be made of cork, felt or other soft resilient material which will effectively take up the undesirable vibrations of the diaphragm.

With these and other objects in view, the invention consists in the novel combination and arrangement of parts which will be fully set forth in the following specification and accompanying drawings, in which:—

Figure 1 is a side view in elevation of a reproducer showing this improved device applied thereto.

Fig. 2 is a vertical sectional view through the reproducer on line 2—2 of Fig. 1 showing the diaphragm in elevation and also showing the stylus bar in elevation, and

Fig. 3 is a perspective view of the attachment.

Referring now to the drawings by characters of reference, the numeral 1 designates as an entirety the housing of the reproducer in which is mounted the diaphragm 2. The usual stylus bar 3 is secured to the diaphragm centrally in the ordinary manner and extends downwardly to the plate 4 mounted to rock on the bearing 5. The usual stylus retainer 6 is provided in which the needle or stylus 7 is secured by means of the thumb screw 8.

The attachment best illustrated in Fig. 3 is designated generally by the numeral 9 and this attachment 9 comprises a cylindrical

body 10 of a relatively soft resilient material such as rubber, cork, felt or the like, which is formed with the transversely extending groove 11 in which the stylus bar rests.

It will be apparent from the foregoing that in use the attachment is slipped beneath the stylus bar as illustrated in Figs. 1 and 2 and in this position it will be evident that the stylus bar will rest in the groove 11 hereinbefore referred to. The flat under face of the cylindrical body will engage the diaphragm 2 and serve to deaden the undesirable noises, thereby eliminating much of the crackling and grating sounds usually accompanying the use of talking machines and phonographs.

While in the foregoing there has been shown and described the preferred embodiment of this invention, it is to be understood that such changes may be made in the combination and arrangement of parts as will fall within the spirit and scope of the appended claims.

What is claimed is:—

1. An attachment for reproducers comprising a cylindrical body of resilient soft material adapted to be positioned between the stylus arm and diaphragm to eliminate undesirable sounds.

2. In combination with a reproducer including a body and a diaphragm mounted within the body, and a stylus arm connected to the diaphragm, of a cylindrical pad of soft resilient material positioned beneath the stylus arm and bearing on the diaphragm to eliminate undesirable sounds.

3. An attachment for reproducers including the combination with a reproducer having a stylus arm attached thereto, the said arm enlarging toward the end opposite that attached to the diaphragm, of a pad of a soft resilient material positioned between the stylus arm and diaphragm and arranged so that the same may be adjusted along the stylus arm to vary the pressure on the diaphragm.

4. The combination with a reproducer having a diaphragm, a stylus arm attached centrally to the diaphragm, a needle holder at the end of the stylus arm opposite that which is connected to the diaphragm, the same arm being enlarged toward the needle holder, of a circular pad of a soft resilient material having a groove extending transversely through one face thereof, said pad being adapted to be positioned between the

stylus arm and the diaphragm with the stylus arm lying in the groove to prevent lateral movement of the pad with relation to the stylus arm.

- 5 5. The combination with a reproducer having a diaphragm, a stylus arm attached centrally to the diaphragm, a needle holder at the end of the stylus arm opposite that which is connected to the diaphragm, the
10 same arm being enlarged toward the needle holder, of a circular pad of a soft resilient material having a groove extending transversely through one face thereof, said pad

being adapted to be positioned between the stylus arm and the diaphragm with the stylus arm lying in the groove to prevent lateral movement of the pad with relation to the stylus arm, said pad being adapted to be adjusted longitudinally of the stylus arm to vary its pressure against the diaphragm. 15 20

In testimony whereof I affix my signature in presence of two witnesses.

EDMUND GOLLMER.

Witnesses:

ROBERT VOIGT,
L. R. FINK.

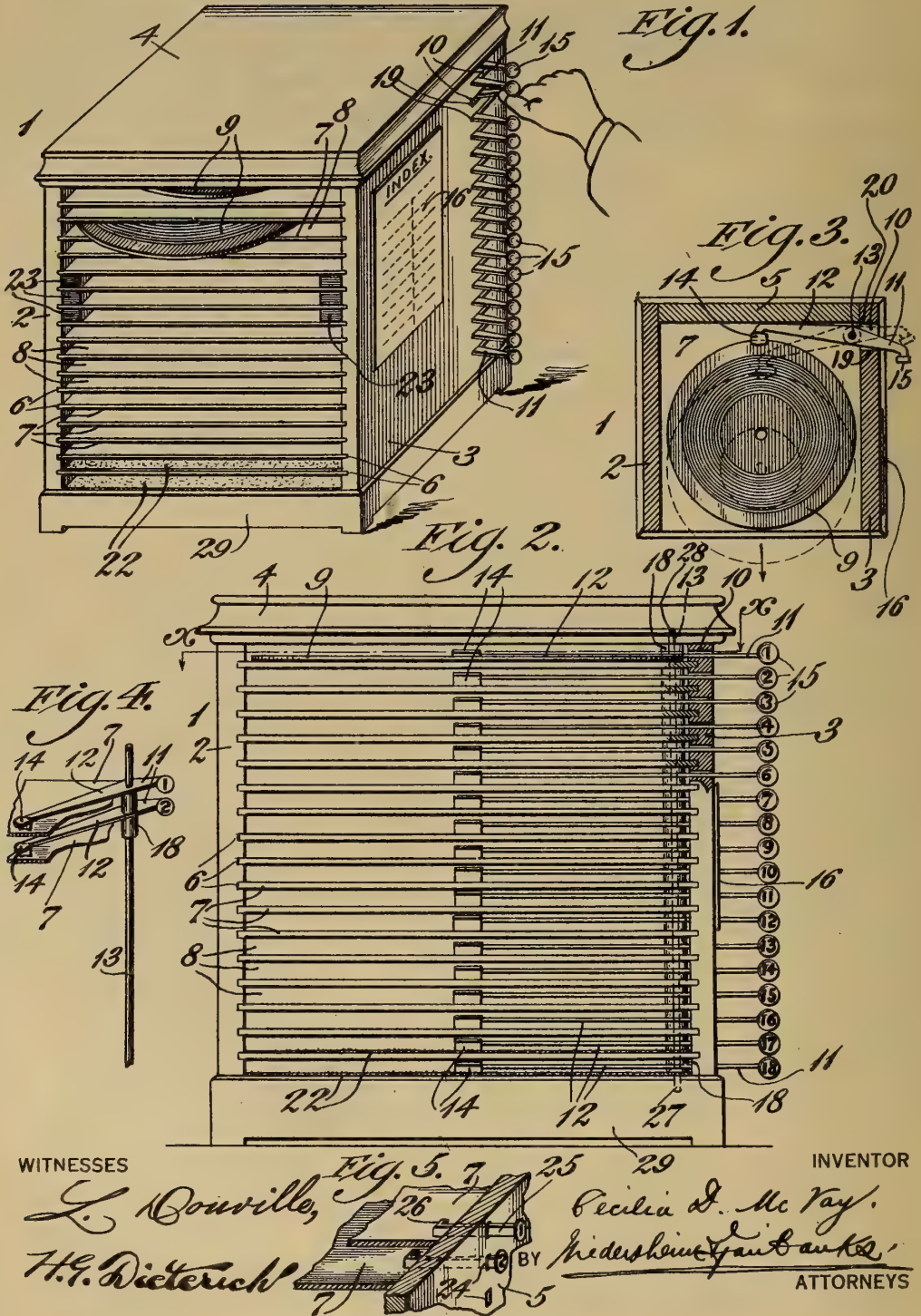
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PHONOGRAPHIC DISK RECORD CABINET,
#1,219,975-----C.D.McVay,
Patented-March 20th, 1917.
Filed-December 31st, 1915.

C. D. McVAY,
 PHONOGRAPHIC DISK RECORD CABINET.
 APPLICATION FILED DEC. 31, 1915.

1,219,975.

Patented Mar. 20, 1917.



WITNESSES

L. Douville,
 H. E. Dieterich



INVENTOR

Cecilia D. McVay,
 BY *Hedersheim & Co.*
 ATTORNEYS

UNITED STATES PATENT OFFICE.

CECILIA D. McVAY, OF PHILADELPHIA, PENNSYLVANIA.

PHONOGRAPHIC-DISK-RECORD CABINET.

1,219,975.

Specification of Letters Patent.

Patented Mar. 20, 1917.

Application filed December 31, 1915. Serial No. 69,529.

To all whom it may concern:

Be it known that I, CECILIA D. McVAY, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Phonographic-Disk-Record Cabinet, of which the following is a specification.

In cabinets for the reception of flat disk records, it has heretofore been proposed to arrange such disk records on their edges in rows and to provide various forms of ejecting devices for propelling the records from the cabinet.

It has been, however, found in practice that the records, particularly of the Victor and Columbia types, are sometimes liable to warp or change their shape somewhat if allowed to stand on their edges for any length of time, unless some special provision is made to prevent this, and my present invention consists of a novel construction of disk record cabinet provided with a series of horizontal partitions, whereby horizontal compartments are formed in which the records are at all times supported flat upon their sides in a lateral or horizontal plane, each compartment being provided with an individual ejector of simple construction, which is pivotally supported, preferably in proximity to the horizontal compartments, one ejector lever being provided for each record or for each compartment, whereby a slight oscillation of said ejector lever by the pressure of the thumb or finger on the portion thereof protruding from the casing will serve to propel the record horizontally from the cabinet, so that they can be grasped by the fingers of the user and withdrawn therefrom.

Another advantage of my construction is that a single standard type of cabinet of my invention is applicable for the reception of records, and, the same type of cabinet can be employed for ten-inch as well as twelve-inch records, so that it is necessary to employ only a single standard size of cabinet for the reception of any or all records.

In certain cabinets of this general character which have heretofore been proposed, there has been no provision made for the ready ejection of a ten-inch record, if improperly or inadvertently placed in the larger compartment adapted for a twelve-inch record, since in such event the ejecting devices for the twelve-inch record might

not be applicable to or coöperative with the ten-inch record, or vice versa, but in my novel construction, the same ejector device is applicable to and efficient with either a thin ten-inch or twelve-inch record or a thicker ten-inch record.

It further consists of other novel features of construction, all as will be hereinafter fully set forth.

For the purpose of illustrating my invention, I have shown in the accompanying drawings one form thereof which is at present preferred by me, since the same will give in practice satisfactory and reliable results, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown and described.

Figure 1 represents a perspective view of a phonographic disk record cabinet having horizontal compartments therein and appropriate ejector devices embodying my invention.

Fig. 2 represents a front elevation of Fig. 1, partly in section.

Fig. 3 represents a section on line $x-x$ of Fig. 2.

Fig. 4 represents a perspective view showing one manner of supporting the levers in position.

Fig. 5 represents a fragmentary perspective view of a modification.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings:—

1 designates my novel construction of disk record cabinet, the same comprising a casing having the side walls 2 and 3, the top member 4 and the back or rear wall 5. The inner walls of the sides 2 and 3 are provided with alining grooves or recesses 6, in which are inserted the horizontal shelves 7, which may be made of wood, paste-board, fiber, thin sheet metal or other material, whereby compartments 8 are formed in which are contained always in horizontal position, the flat disk records 9. In order to propel the records forwardly in a lateral or horizontal direction, I provide one of the sides, preferably the right-hand side 3, with a series of slots 10, through each of which projects an end 11 of an ejector lever 12, there being a lever for each compartment

and said levers being fulcrumed on the rod 13 and each provided with the deflected or projecting terminal member or finger 14, which may be of angular or other shape, as will be understood from Fig. 4, and which is adapted to contact with the rear edge of the juxtaposed record 9.

The outer portions of each of the ejector levers 11 are provided with finger pieces 15, which have thereon suitable numerals or indicia corresponding to numerals or indicia on the index card 16.

It will be understood from the foregoing that each horizontal record compartment 8 is provided with its individual ejector, whose finger piece has a suitable numeral or the like thereon, said numeral corresponding to a name and number on the index card 16, so that when it is desired to play a particular record, it is only necessary to glance at the index 16 located in proximity to the ejector levers 12 and to press backwardly the proper ejector lever, whose number can be easily simultaneously ascertained at a glance.

The back 5 of the cabinet can be made removable, so that ready access can be had at all times to the ejector levers or to the rear of the horizontal compartments 8, if desired for any purpose. The ejector levers 12 can be cheaply manufactured, as they can be sawed, stamped or pressed out of sheet metal and are readily assembled upon their fulcrum, comprising the single rod 13, which may be provided with a series of spacing sleeves 18 or the like, which are located between the superposed levers 12, as will be understood from Fig. 4. The front terminus 19 of the slot 10, as also the back 5, limits the forward movement of the portion 11 of the ejector levers, while the rear terminus 20 of said slot limits the opposite movement of said ejector levers 12.

It will be seen from the foregoing that my novel construction of cabinet is exceedingly simple, as it has no complicated internal mechanism and no springs are required to reset the ejector devices, since the mere replacing of the records in their horizontal compartments and pushing them backwardly, will cause the ejector devices to assume the desired operative position, and after any lever has been actuated to propel a record forwardly, it is apparent that said lever will remain in the position dotted in Fig. 3, and thus serve as a telltale to indicate at a glance the compartment in which to replace the record.

As will be understood from Figs. 2 and 4, the terminal 14 of each ejector lever rests upon the top of its proper shelf 7, so that no guiding or supporting devices are required for the ejector levers other than the vertical fulcrum rod 17 and the support afforded by the bottom shelf of each of the

compartments 8, as will be seen from Fig. 2, and if desired, I may slightly weight the terminal 14, so that it will at all times properly contact with the bottom of its respective compartment.

If desired, the top surfaces of the shelves 7 may be lined with a suitable lining of felt or cloth, as indicated at 22, and if it is desired to equip a portion of the cabinet, as the upper half, with compartments especially adapted only for ten-inch records and the lower half for twelve-inch records, this can be readily done by merely inserting filler pieces, as indicated at 23 in Fig. 1, in the outer portions of such compartments as are desired to be used exclusively for ten-inch records. This, however, is not essential or necessary, as the same size of compartments can be employed in connection with either a ten-inch record or a twelve-inch record, as above stated.

In the use or operation of my device, it will be apparent that the records are at all times supported flat upon their sides, so that all liability of their warping or changing their contour is reduced to a minimum and the stability and life of the record is thus assured and prolonged.

In many instances, particularly in the case of expensive records, the owners thereof prefer them to be kept in their inclosing envelopes when not in use, and it will be apparent that my novel collocation of ejector levers is readily applicable to the ejection of the records, either with or without their inclosing envelopes.

It will be obvious that any number of horizontal compartments 8 may be employed, and that my device may be constructed of units after the manner of a sectional bookcase, which may be superposed upon each other, according to requirements.

While I have shown the preferred form of ejector device which may be employed, it will be apparent that the shape of the same may be changed, and that I may if desired employ a series of movable push buttons located in the back wall 5, as will be understood from Fig. 5.

In this construction, which I may employ in lieu of the ejector devices seen in the other figures, it is only necessary to provide the back wall with a row of slots 24, in which the ejector push buttons or bars 25 are located, the latter having the deflected terminal or the like 26, which is slidably mounted on the top of its appropriate shelf 7, said bars 25 being provided with the finger pieces 15, of the same character as already described.

In the construction seen in Fig. 5, it will be apparent that the pushing of the records rearwardly will push the ejector buttons or bars outwardly into their proper position, and when it is desired to use a

particular record, the same can be propelled forwardly by pushing inwardly the proper button. The device seen in Fig. 5 can be cheaply manufactured, as the back wall 5 carries all the ejector mechanism, which can be readily assembled or dismantled, as desired. I may apply felt or other cushioning material to the terminals 14 or 26, if desired.

10 The vertical rod 13 may be supported in suitable bearings, or, as shown in the present instance, may be stepped into seats or recesses 27 and 28 in the base 29 and top 4, respectively.

15 It will be apparent that in assembling my device, the base 29 and the sides 2 and 3 can first be assembled together with the horizontal shelves 7. The vertical rod 13 can be supported in openings formed in said shelves 7, and, if desired, merely abut on the top of the base 29 and the bottom of the top 4, as will be apparent, the top 4 and the rear wall 5 being last placed in position. If, however, it should be desired to have the ends of the vertical rod 13 secured in suitable seats, the construction shown in Fig. 2 can be employed.

When the construction shown in Fig. 5 is employed, it will be apparent that it will only be necessary to assemble the rear wall 5 in position after the other parts have been assembled.

The sides, top and rear wall can be secured in assembled position with respect to each other or to the base 29 and secured by any suitable fastening devices.

By the removal of the rear wall 5, it will be apparent that ready access can be had to the rear of the compartments 8 at all times.

40 It will now be apparent that I have devised a novel and useful construction of a phonographic disk record cabinet, which embodies the features of advantage enumerated as desirable in the statement of the invention and the above description, and while I have, in the present instance, shown and described a preferred embodiment thereof which will be found in practice to give satisfactory and reliable results, it is to be understood that the same is susceptible of modification in various particulars without departing from the spirit or scope of the invention or sacrificing any of its advantages.

55 Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a phonographic disk record cabinet, a casing having a series of superimposed

substantially-horizontal phonographic-record receiving compartments, a plurality of substantially-horizontally-movable ejector devices, one for each of said compartments and guides on said casing for insuring the horizontal oscillation of said ejector devices, said ejector devices being movable in said guides and having their inner ends located in said compartments and movable in parallelism therewith and their outer ends projecting therefrom.

2. A phonographic disk record cabinet, comprising a casing provided with a series of horizontal compartments, a portion of said casing having a vertical series of slots therein, in proximity to said compartments, a plurality of oscillatory ejector levers supported within said casing and having their inner terminals, laterally movable in parallelism with the shelf of the alining compartment, the outer terminals constituting finger-pieces for said ejector levers, a single rod serving as a fulcrum and passing vertically through said levers, and spacing devices carried by said rod and interposed between said levers.

3. A phonographic disk record cabinet, comprising a casing provided with a series of substantially-horizontal compartments, a portion of said casing having a vertical series of slots therein, in proximity to said compartments, a plurality of oscillatory ejector levers supported in said slots and having their inner terminals substantially-horizontally-movable in parallelism with the shelves of the alining compartments, the outer terminals constituting operating members for said ejector levers and a single rod serving as a fulcrum and passing vertically through said levers.

4. A phonographic disk record cabinet, comprising a casing provided with a series of horizontal compartments, a portion of said casing having a series of slots therein in alinement with said compartments and a plurality of laterally movable ejector levers pivotally supported in proximity to said slots, one portion of each of said ejector levers projecting outside of said slots and provided with finger pieces and the inner terminals of said ejector levers extending into their proper compartments and adapted to contact with the rear edge of the records placed therein.

CECILIA D. McVAY.

Witnesses:

F. P. FELTON, Jr.,
M. E. BYRNE.

PHONOGRAPH,
#1,220,480-----P. Weber,
Patented-March 27th, 1917.
Filed-August 6th, 1910.

P. WEBER.
PHONOGRAPH.

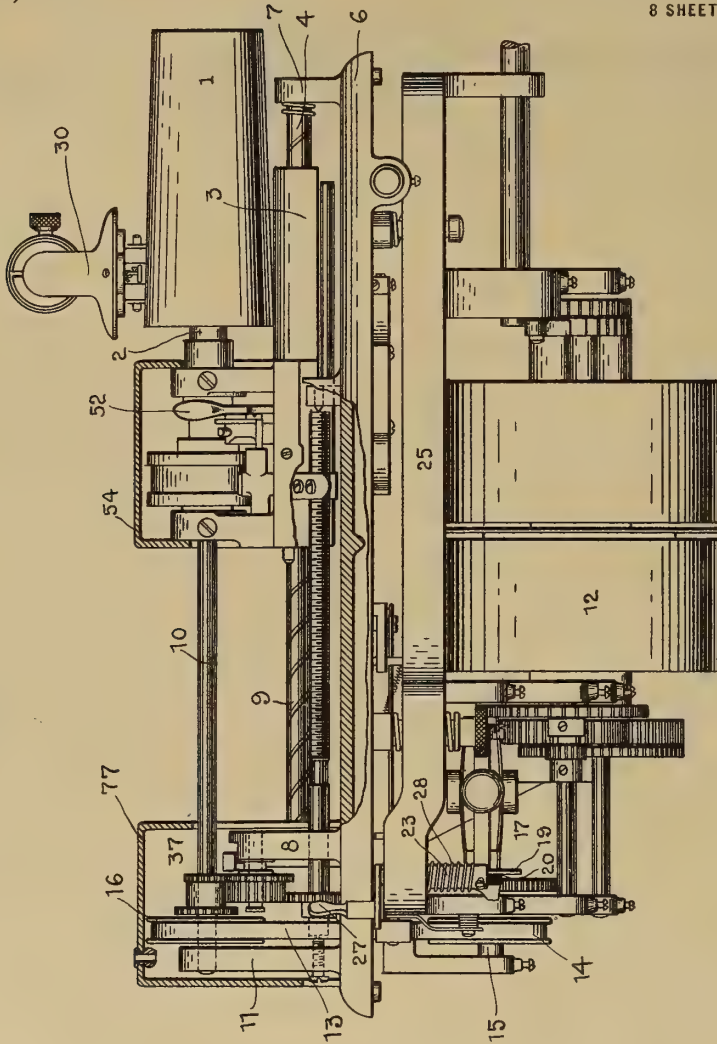
APPLICATION FILED AUG. 6, 1910.

1,220,480.

Patented Mar. 27, 1917.

8 SHEETS—SHEET 1.

Fig. 1



Witnesses:

Robert M. Sutphen.
Dyer Smith

Inventor:

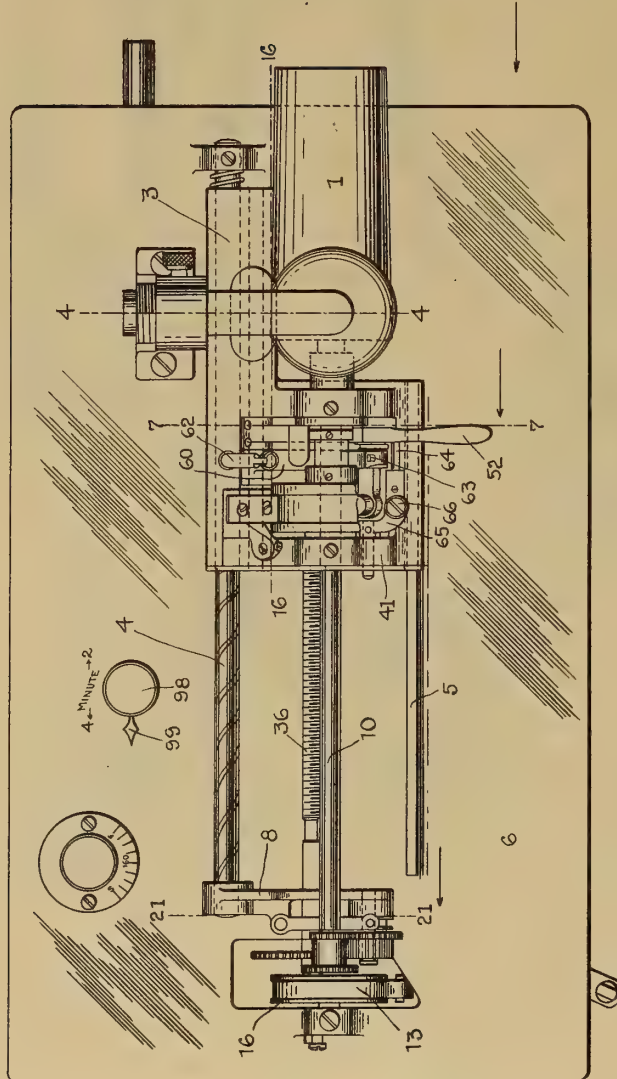
Peter Weber
by Frank L. Dyer
His Atty.

P. WEBER.
 PHONOGRAPH.
 APPLICATION FILED AUG. 6, 1910.

1,220,480.

Patented Mar. 27, 1917.
 8 SHEETS—SHEET 2.

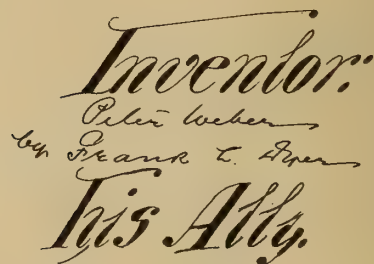
Fig. 2



Witnesses:
 Robert M. Sutphen.
 Dyer Smith

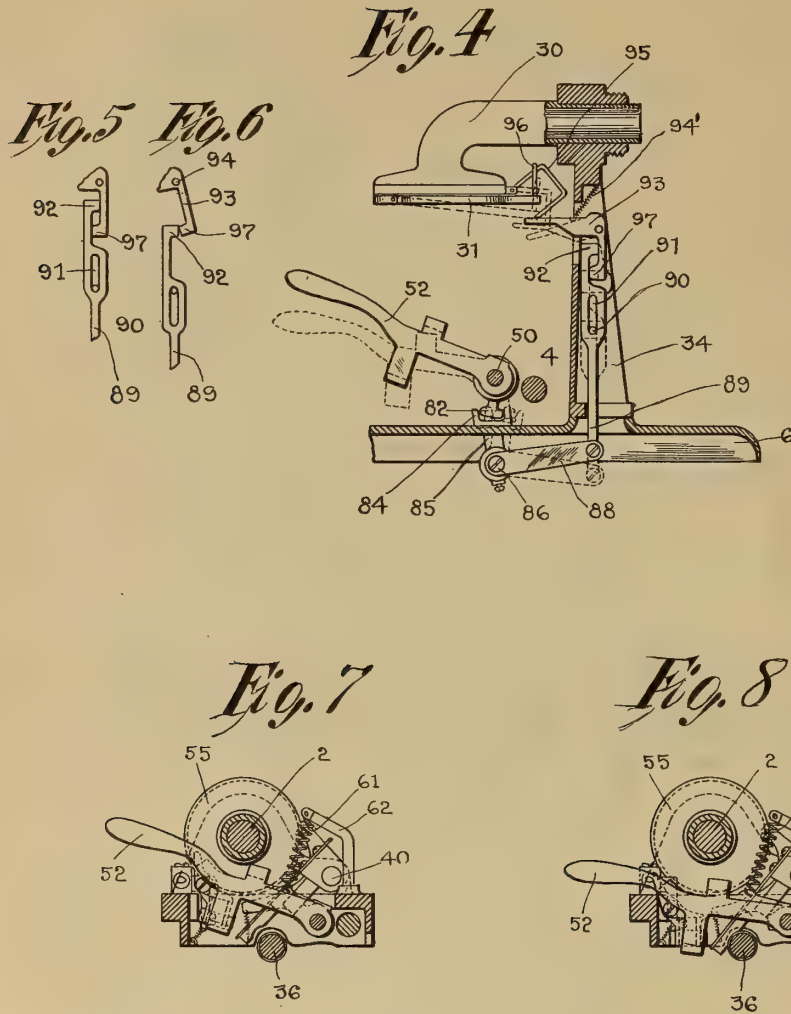
Inventor:
 Peter Weber
 by Frank L. Dyer
 His Atty.

Patented Mar. 27, 1917.
8 SHEETS—SHEET 3.



1,220,480.

Patented Mar. 27, 1917.
 8 SHEETS—SHEET 4.



Witnesses:
 Robert M. Sutphen.
 Dyer Smith

Inventor:
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 His Atty.

P. WEBER.
PHONOGRAPH.

APPLICATION FILED AUG. 6, 1910.

1,220,480.

Patented Mar. 27, 1917.

8 SHEETS—SHEET 5.

Fig. 9

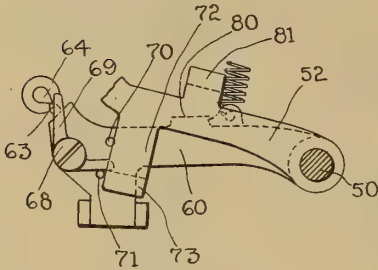


Fig. 10

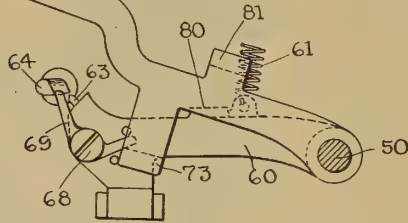


Fig. 11

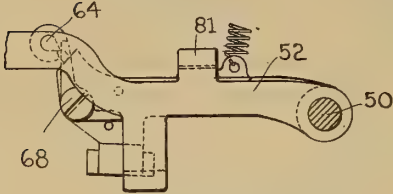


Fig. 12

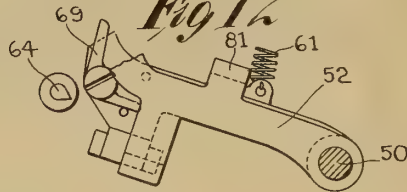


Fig. 13

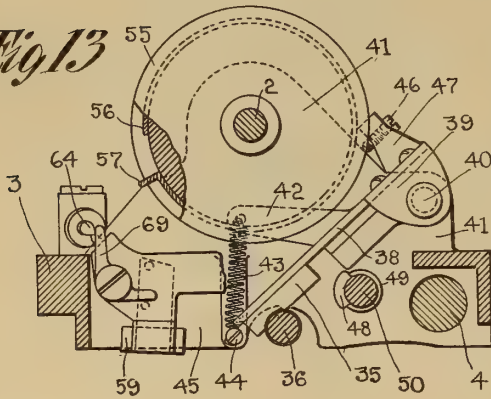
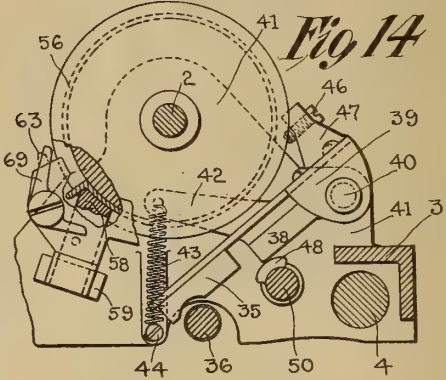


Fig. 14



Witnesses:

Robert M. Sutphen.
Dyer Smith

Inventor:

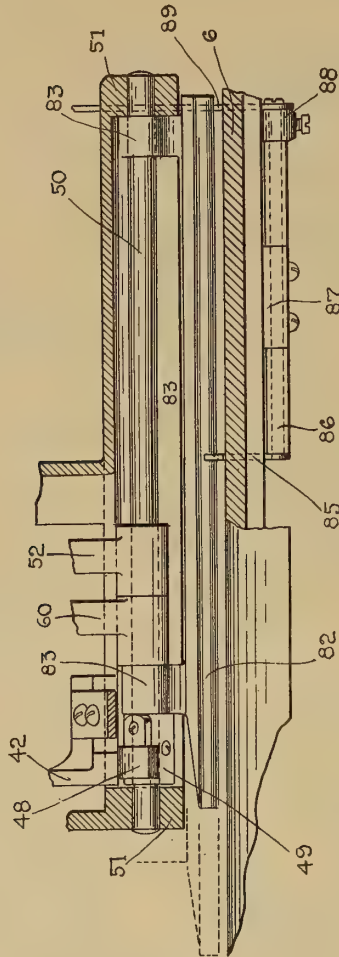
Peter Weber
by Frank L. Rogers
His Atty.

P. WEBER.
PHONOGRAPH.
APPLICATION FILED AUG. 6, 1910.

1,220,480.

Patented Mar. 27, 1917.
8 SHEETS—SHEET 6.

Fig. 16



Witnesses:

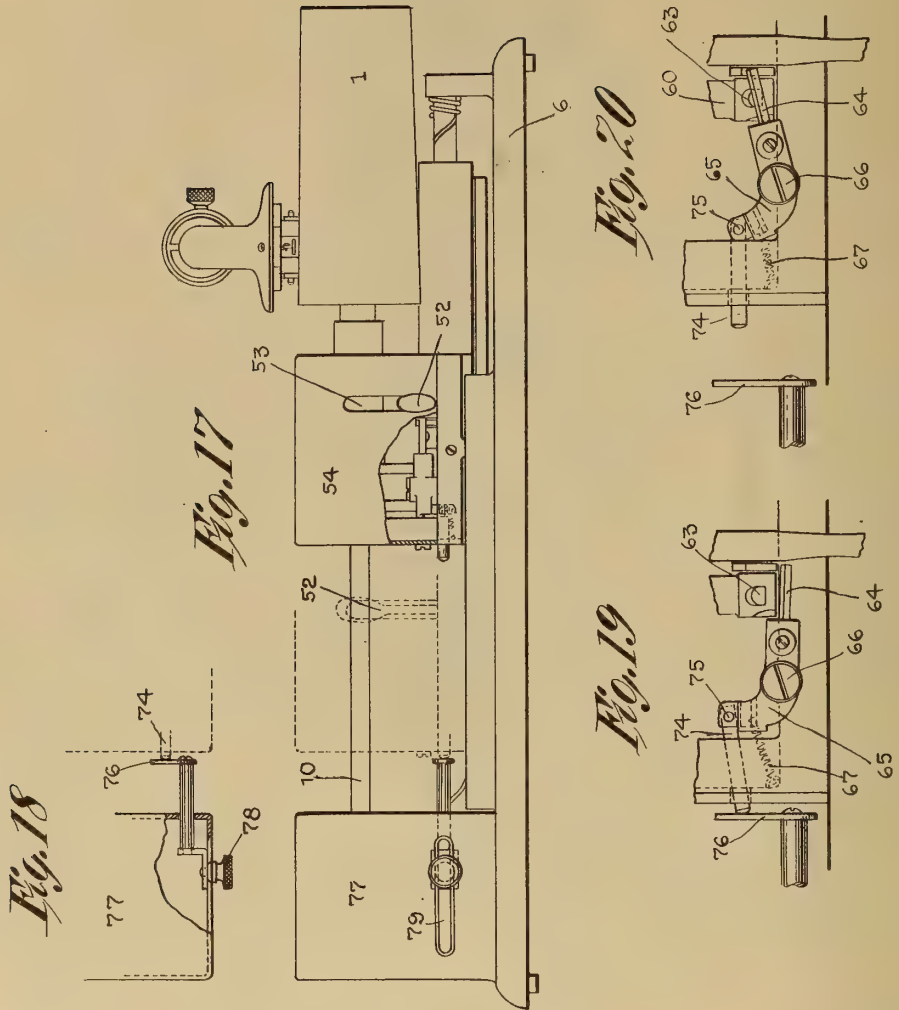
Robert M. Sutphen
Dyer Smith

Inventor:

Peter Weber
by Frank L. Allen
His Atty.

1,220,480.

Patented Mar. 27, 1917.
8 SHEETS—SHEET 7.



Witnesses:
Robert M. Sutphen.
Dyer Smith

Inventor:
Peter Weber
by Frank T. Allen
His Atty.

1,220,480.

Patented Mar. 27, 1917.
 8 SHEETS—SHEET 8.

Fig. 21

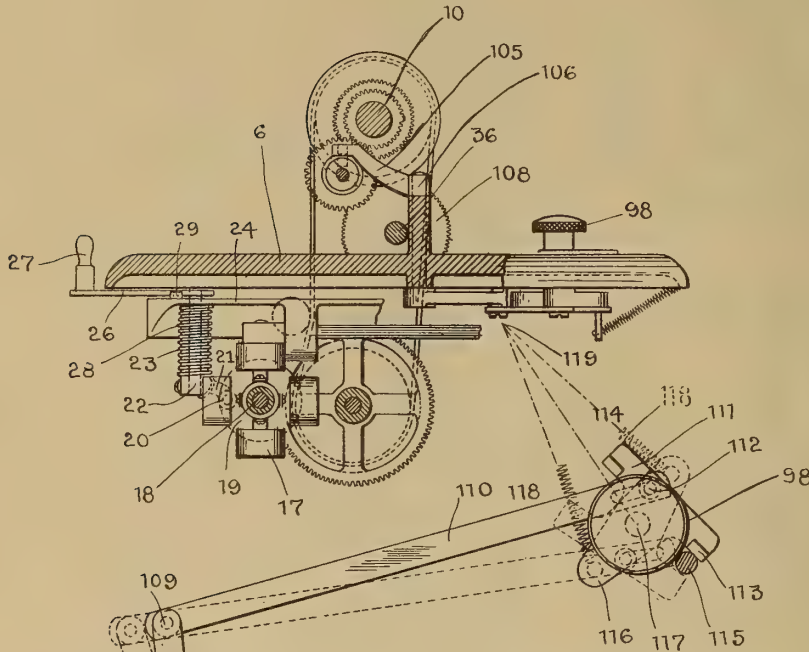
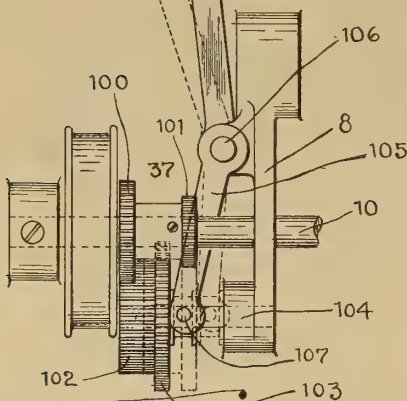


Fig. 22



Witnesses:

Robert M. Sutphen.
 Dyer Smith

Inventor:

Peter Weber
 by Frank W. Raper
 His Atty.

UNITED STATES PATENT OFFICE.

PETER WEBER, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

1,220,480.

Specification of Letters Patent. Patented Mar. 27, 1917.

Application filed August 6, 1910. Serial No. 575,861.

To all whom it may concern:

Be it known that I, PETER WEBER, a citizen of the United States, and a resident of Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs, and particularly to phonographs of the type in which the relative feed between the reproducing stylus and the record is obtained by the shifting of the record mandrel axially past the reproducer which is stationary, although my invention is not limited as to all its features to a phonograph having an axially movable mandrel. Among the objects of my invention are the provision of improved starting and stopping means, both manual and automatic, means for raising the floating weight of the reproducer to withdraw the reproducing stylus out of operative position when the machine is stopped, and for at the same time withdrawing the feed nut from the feed screw, and also improved means for changing the rate of feed of the phonograph, so that the same may be adapted to operate upon different kinds of records, as, for example, the so-called 2-minute and 4-minute records. My invention comprises the starting and stopping of the rotating mandrel by a lever or other simple manipulative means, which, at the same time controls the adjustment of the stylus into or out of operative position, and also the engagement or non-engagement of the feed nut with the feed screw, this starting and stopping lever being preferably mounted upon the traveling carriage of a movable mandrel phonograph, which is also provided with an automatic stopping means adapted to be operated to stop the rotation of the record, stop the feed, and place the stylus in inoperative position at a predetermined point in the travel of the carriage, as at the end of the record. Other objects of my invention will appear in the following specification and appended claims.

In order that a clearer understanding of my invention may be had, attention is hereby directed to the accompanying drawings, forming part of this specification, and disclosing one embodiment of my invention. The same reference characters will be used

throughout the figures to denote corresponding parts. In the drawings, Figure 1 represents a side elevation, partly in section, of a phonograph embodying my invention. Fig. 2 represents a plan view of the same. Fig. 3 represents an end view looking in the direction of the arrow in Fig. 2. Fig. 4 is a cross section on line 4—4 of Fig. 2, some of the parts being shown in side elevation. Figs. 5 and 6 are details of the mechanism shown in Fig. 4 for raising and lowering the floating weight, the mechanism being in such a position in Fig. 5 that the weight may be lifted, and the lifting device in retracted position being shown in Fig. 6. Figs. 7 and 8 are cross sections taken on line 7—7 of Fig. 2, Fig. 7 representing the mechanism when the machine is stopped, and Fig. 8 showing the mechanism when in running position. Figs. 9, 10, 11 and 12 are enlarged detail views of the starting and stopping lever and coöperating parts illustrated in Figs. 7 and 8, the mechanism being shown in Fig. 12 in stopped position, in Fig. 11 in running position, and in Figs. 9 and 10 the latched stopping lever is being tripped to stop the mechanism. Figs. 13 and 14 are enlarged views similar to Figs. 7 and 8, the manually-operated lever shown in Figs. 9 to 12 being omitted for clearness. Fig. 15 is an isometric view partly in section of the stopping drum carried by the mandrel shaft shown in Figs. 13 and 14 with the coaxing projection carried by the stopping lever. Fig. 16 is a partial vertical section taken on line 16—16 in Fig. 2. Fig. 17 is a side elevation of the phonograph with the casings inclosing the change gears and the starting and stopping mechanisms in place showing the operation of the automatic stopping device. Fig. 18 is a partial plan showing the adjustment of the stop contacted by the starting and stopping device. Figs. 19 and 20 are partial plan views of the automatic stopping device carried by the traveling carriage, the carriage approaching the end of its travel in Fig. 20 with the stopping lever held in latched position, the automatic stopping device having contacted the stopping lug in Fig. 19 and the latch being tripped. Fig. 21 is a partial section taken on line 21—21 of Fig. 2, and Fig. 22 is a plan view made on a larger scale of the change gear mechanism shown in Fig. 21, part of the mechanism

shown being located beneath and part above the bed plate of the phonograph which is not illustrated in this figure for clearness.

Referring to the drawings, the mandrel 1 adapted to support a cylindrical sound record is rigidly mounted on hollow shaft 2 carried by traveling carriage 3 which is adapted to travel back and forth upon rod 4 and slideway 5 projecting upwardly from the top of bed plate 6 of the phonograph. Guide rod 4 is carried in brackets 7 and 8 rising from bed plate 6 and is preferably provided with a spiral channel 9 for holding oil for lubricating the sliding bearing of the traveling carriage upon the same. Mandrel 1 and shaft 2 are rotated by means of shaft 10 which is rotatably mounted, one end of the same shown to the left in Fig. 1 being supported by bracket 11 rising from bed plate 6 of the phonograph, the other end of shaft 10 being supported within the hollow shaft 2 of mandrel 1. The right-hand end of shaft 10, referring to Fig. 1, is provided with a key which is adapted to be located within a keyway on the inner surface of hollow shaft 2, so that rotation may be imparted to shaft 2 from shaft 10, while at the same time, shaft 2 may be moved lengthwise along shaft 10 during the travel of carriage 3. Rotation is imparted to shaft 10 from spring motor 12 through belt 13 which runs over belt wheel 14 on shaft 15 and belt wheel 16 mounted on shaft 10. The motor 12 is governed by the usual centrifugal governor 17.

The governor shaft 18 is provided with the usual friction disk 19 with which coacts the friction pad 20 carried by arm 21 to stop and start the motor in the usual manner. The manner of moving the friction pad into and out of contact with the friction disk is, however, a feature of my invention. Arm 21 is integral with vertical rod 22 which extends through a sleeve 23 secured to or integral with the lower side of the horizontal portion 24 of the motor-carrying frame 25, as shown in Figs. 1 and 21. On the upper end of rod 22 is secured above horizontal frame member 24 the arm 26 having integral therewith or secured thereto a handle 27. A spiral spring 28 encircles sleeve 23, the upper end of the spring being secured to the under side of frame member 24, and the lower end of the spring being wrapped about and secured to arm 21 carrying pad 20 in such a manner that the tendency of spring 28 is always to force pad 20 into contact with disk 19. A small lug or pin 29 rises from the upper surface of frame member 24 to form a stop or abutment to hold arm 26 in such position that pad 20 is out of contact with disk 19 and the motor is free to run. When it is desired to stop the motor, arm 26 is oscillated by means of handle 27 in the direction to bring pad 20 into con-

tact with disk 19, arm 26 rising above stop 29 as it contacts the same, a sufficient amount of vertical play being permitted rod 22 in sleeve 23, spring 28 tending to depress rod 22 and arm 21 into their lower position. When arm 26 is passed over stop 29, spring 28 forces pad 20 into contact with disk 19. When the motor is to be allowed to run, handle 27 is pressed in the opposite direction until it passes over stop 29, when spring 28 lowers rod 22 to latch arm 26 back of stop 29 to hold pad 20 out of contact with disk 19.

The reproducer sound box 30 which is provided with floating weight 31 carrying stylus lever 32 and stylus 33 is supported rigidly by vertical bracket 34 rising from and secured to bed plate 6 of the phonograph. Bracket 34 is hollow and contains mechanism for lifting floating weight 31 to move stylus 33 out of operative position, as will be described. When stylus 33 is operatively positioned it is adapted to coact with a phonograph record carried by mandrel 1, the mandrel and record being rotated through shaft 10 as has been described, and the relative feed between the record and the stylus being secured by the longitudinal movement in a straight line of the mandrel 1 carried by traveling carriage 3. This travel is imparted to carriage 3 by any suitable means, such as the coaction of the usual half nut 35 carried by carriage 3 with the feed screw 36 which is supported in brackets rising from bed plate 6. Screw 36 is rotated from shaft 10 by means of gearing 37, as shown in Figs. 1 and 22, at either of two desired speeds, as will hereinafter be described. Feed nut 35 is carried by arm 38 secured to a member 39 pivotally mounted upon a stud 40 carried by bracket 41 rising from one end of traveling carriage 3, as shown in Figs. 2 and 13. Member 39 to which arm 38 carrying feed nut 35 is secured has formed integral therewith an arm 42 to which is secured a spiral spring 43, the other end of which is attached at 44 to the end member 45 of traveling carriage 3, spring 43 tending to move member 39 about its pivot 40 to move nut 35 into contact with feed screw 36. The engaging position of the feed nut with the feed screw may be adjusted by means of a suitable screw 46 mounted in arm 47 secured to or integral with member 39 pivoted on stud 40, the end of stop screw 46 engaging the side surface of bracket 41 to limit the movement of the nut into engagement with the feed screw, as shown in Figs. 13 and 14, the nut being shown in engagement in Fig. 13, and out of engagement in Fig. 14.

The nut is moved out of engagement with the feed screw against the elastic force of spring 43 by means of a cam surface 48 upon a sleeve 49 secured to a horizontal shaft 50, which is rotatably mounted in depending

flanges 51 at the lower part of traveling carriage 3, as shown in Fig. 16. Cam 48 upon the oscillation of shaft 50 contacts the lower surface of arm 42 secured to member 39 pivoted on stud 40 to raise nut 35 out of contact with screw 36, thereby tensioning spring 43.

Rock shaft 50 may be oscillated to move the feed nut into and out of engagement with the feed screw by means of hand lever 52 secured to rock shaft 50 and having its handle extending downwardly through a slot 53 in the casing 54 which covers the mechanism being described upon carriage 3 as shown in Fig. 17. The oscillation of rock shaft 50 is adapted not only to move the feed nut into or out of engagement with the feed screw, but at the same time to operate the starting and stopping lever to permit the rotation of the mandrel 1 or to prevent the same, and also to operatively position the stylus 33 or to move the same into inoperative position. These means will now be described.

Mandrel shaft 2 carries a flanged disk or drum 55 which carries a band 56 encircling the major portion of the disk or drum between the flanges of the same, said band 56 preferably being provided with outwardly extending lug 57. A pin 58 carried by a horizontally extending portion 59 of an arm 60 loosely mounted upon rock shaft 50 is adapted to be brought into the path of lug 57 upon band 56 to stop the rotation of shaft 2 and mandrel 1 whenever it is desired to stop the phonograph, at the same time that the feed nut is moved out of engagement with the feed screw, so that the traveling carriage 3 can be returned to its starting point. Pivoted arm 60 is given a constant tendency to cause pin 59 to contact brake band 56 and place the same in the path of lug 57 by spiral spring 61 secured to the upper side of pivoted arm 60 and at its other end secured to an arm 62 carried by traveling carriage 3 as shown in Figs. 2, 7 and 8. Arm 60 carries at its upper end a knife-edged pin 63 adapted to coact with pin 64 which is horizontally disposed and secured to bell crank 65 pivoted at 66 to traveling carriage 3, as illustrated in Figs. 2, 19 and 20, the engagement of pin 63 with pin 64 serving to latch arm 60 in its lower position with pin 58 out of the path of lug 57, so that the mandrel is free to rotate. Bell crank 65 is held in position to cause pin 64 to engage over pin 63 carried by arm 60 when arm 60 is depressed by means of spiral spring 67 attached to bell crank 65 and to the end member of traveling carriage 3. When bell crank 65 is oscillated to the right, as shown in Figs. 19 and 20, the latch will be tripped, pin 63 released from pin 64, and arm 60 moved forwardly by spring 61 to cause pin 58 to engage the band 56 upon drum 55 to stop the mandrel when lug 57

on band 56 contacts pin 58 in the revolution of the drum.

Bell crank 65 may be oscillated to trip the latch and release arm 60 either by means of hand lever 52 at any time or automatically when the carriage reaches a predetermined point in its travel at the end of the record. Arm 60 carries pivoted thereto at 68 a bell crank trigger 69. Pins 70 and 71 mounted on arm 60 coact with the lower arm of bell crank 69 to limit the movement thereof in either direction. Lever 52 has extending downwardly therefrom an arm 72 carrying a lateral lug 73 which, upon the upward movement of lever 52 is adapted to strike the lower part of bell crank 69 and cause the same to oscillate to the left, referring to Figs. 9 to 12 inclusive. As trigger 69 is moved to the left, the end of its upper arm contacts pin 64 and moves the same to the left, as shown in Fig. 9, pin 63 being released from pin 64 and arm 60 moving upwardly to stop the rotation of the mandrel. The relative positions of levers 52 and 60, trigger 69, and pin 64, when the pin 58 is in contact with stop lug 57 and the mandrel is stopped, are shown in Fig. 12. In Fig. 11 the parts are shown in latched position, the phonograph running, and in Figs. 9 and 10 the latch is just being tripped to stop the machine.

The latch may be tripped to release arm 60 automatically by the engagement of the pin 74 pivotally connected at 75 to bell crank 65 with an adjustable stop 76 carried by the casing 77 surrounding the change gears 37 as shown in Figs. 17 to 20 inclusive. The pin 74 extends through an opening in the end member of traveling carriage 3 as shown, and adjustable stop 76 extends through an opening in casing 77, the position of stop 76 being adjusted by means of thumb screw 78 which is adapted to clamp stop 76 at any desired position along the slot 79 in casing 77. In Fig. 20, the traveling carriage is shown approaching the adjustable stop 76 with arm 60 in latched position. In Fig. 19, pin 74 has contacted stop 76 and bell crank 65 has been moved to the right to release the arm 60 and permit the phonograph to be stopped. In practice, when one plays a record which has been placed on mandrel 1, the traveling carriage is moved to the left to position the stylus opposite the end of the record, when stop 76 may be adjusted into position to engage pin 74, so that when the record is played, the machine will automatically stop exactly at the end of the record.

When arm 60 is released manually through the movement of hand lever 52 to stop the machine, lever 52 moves a sufficient distance before lug 73 contacts the lower member of trigger 69 to cam the feed nut 35 out of engagement with feed screw 36, since lever 52 is secured to rock shaft 50, to which

also is secured cam lug 48 which lifts arm 38 carrying the feed nut upon the oscillation of rock shaft 50. When, however, the latch is tripped automatically through the engagement of pin 74 with stop 76, the necessary movement of rock shaft 50 is obtained by the engagement of surface 80 upon the upper side of lever 60 with the under side of a lateral projection 81 on hand lever 52, so that hand lever 52 will be carried up with arm 60 as the latter is moved to stopping position by spring 61, and shaft 50 will be rocked as before to move the feed nut out of engagement with the screw. When the machine is to be started, lever 52 is depressed, lug 81 thereon forcing arm 60 downwardly until pin 63 moves under pin 64 to latch arm 60 in lowered position with the feed nut engaging the feed screw and the mandrel in rotation.

Band 56 encircling the drum 55 is preferably not positively secured to the same, but engages the drum closely by friction, thus relieving shock when pin 58 contacts lug 57 on the band 56. It is obvious that in place of forming band 56 with the lug 57 and thus stopping the phonograph by positive contact, lug 57 might be omitted and band 56 made continuous, and the machine stopped by the braking action of pin 58 upon the band 56.

As stated, the floating weight 31 of reproducer 30 is adapted to be positioned by the oscillation of rock shaft 50 at the same time that the feed and rotation of the mandrel are adjusted. Rock shaft 50 has pivotally secured thereto a rod 82 of approximately the same length as rock shaft 50, rod 82 being pivotally connected to rock shaft 50 adjacent its two ends by means of arms 83, as shown particularly in Fig. 16. As the traveling carriage travels along its path, rod 82 carried by the carriage slides between the arms 84 of a forked lever 85 pivoted on rod 86 mounted below the bed plate 6 of the phonograph, the forked arms 84 of lever 85 extending through a slot in the bed plate. Rod 86 is secured to bed plate 6 by means of bracket 87. A lever 88 is secured upon the end of rod 86 opposite to bell crank 65, referring to Figs. 4 and 16, and the vertical link 89 is pivotally connected to the opposite end of lever 88, and extends upwardly within the hollow stationary reproducer supporting arm 34, being guided by pin 90 engaging within slot 91 of link 89. It is obvious that the oscillation of shaft 50 causes the vertical reciprocation of link 89 by the engagement of rod 82 with one arm or the other 84 of lever 85. The upper end of link 89 is formed with a cam lug 92. A trigger or bell crank 93 is pivoted at 94 to bracket 34, above the top of link 89, spring 94' attached to bell crank 93 and to the bracket 34 tending constantly to move bell

crank 93 to the right, referring to Fig. 4. Floating weight 31 has pivotally secured thereto an inverted U-shaped member 95, the upward movement of which is limited by engagement with stirrup 96 carried by floating weight 31. The lower end of member 95 contacts the upper arm of bell crank 93, so that when the bell crank is moved to the right by spring 94', the upper arm of bell crank 93 lifts member 95 and floating weight 31 to move stylus 33 out of contact with the record carried by mandrel 1. This position of the parts is shown in full lines in Fig. 4, the opposite position in which the floating weight is lowered and the stylus is in engagement with the record, being shown in Fig. 4 in dotted lines. Trigger 93 has formed upon the lower end of the lower arm thereof a cam lug 97, which is adapted to coact with lug 92 upon the upper end of link 89. When the machine is stopped, hand lever 52 being in its upper position, lug 92 on link 89 is situated above lug 97 on trigger 93, the latter being moved into its raised position to elevate the floating weight. When rock shaft 50 is rocked to the left, however, referring to Fig. 4, as by the downward movement of hand lever 52, to permit the mandrel to rotate to cause the engagement of the feed nut with the feed screw, link 89 is moved downwardly, lug 92 on the link camming lug 97 on the bell crank 93 to the right to permit the stylus to descend into engagement with the record. The positions of the link and the bell crank when the machine is running are shown in Fig. 6, and the positions of the same parts when the machine is stopped, in Fig. 5.

As has been stated, the feed screw 36 is rotated from shaft 10 by means of gearing 37, when it is desired to operate upon two kinds of records upon the same machine, as the so-called 2-minute and 4-minute records, means for changing the rate of rotation of feed screw 36 should be provided. I have shown such feed changing means in Figs. 2, 21 and 22, and in Fig. 22 particularly. As there illustrated, the hand knob 98 extends vertically through bed plate 6 and is provided with a pointer 99 adapted to coact with suitable indicia upon the bed plate as the words "4-minute" and "2-minute" to indicate the position of the gears for playing either 2-minute or 4-minute records. As shown, shaft 10 is provided with fixed gears 100, and 101, gears 102 and 103 being mounted upon a stud 104 which is slidably mounted in bracket 8 rising from bed plate 6. Gears 102 and 103 are adapted to be shifted to the right or left, referring to Fig. 22, by means of shifting lever 105 pivoted at 106 and carrying pin 107 engaging between shoulders secured to gears 102 and 103 for shifting the same. Gear 103 is a narrow gear, and gear 102 is a broad gear, which in

both positions engages with gear 108 secured to the shaft of feed screw 36. When the change gears are moved to the right, gear 103 engages gear 101 and shaft 36 is driven from shaft 10 through gears 101, 103, 102 and 108. When the change gears are moved to the left, however, gear 103 is moved out of contact with gear 101 and gear 102 moved into contact with gear 100, the feed screw then being driven through gears 100, 102 and 108 at a different speed from that imparted to the feed screw by the first combination. Vertical pin 106 upon which is pivoted shifting lever 105 is mounted in an offset of bracket 8 and extends downwardly through bed plate 6, the lower end of pivot pin 106 having pivoted thereto at 109 link 110. Knob 98 extends downwardly through bed plate 6 and has secured to it beneath the bed plate the member 111. Link 110 is connected to member 111 by means of the pin and slot connection 112. Member 111 has formed thereon surfaces 113 and 114 which are adapted to contact stop pin 115 extending downwardly from the bottom of bed plate 6 to position member 111 and the change gears 102 and 103 in proper position for operating upon either the 2-minute or the 4-minute record. Member 111 has an arm 116 extending therefrom on the opposite side of pivot 117 of member 111 from the stop lugs 113 and 114, and a spiral spring 118 is attached to the end of arm 116, the other end of spring 118 being secured to bed plate 6 as indicated at the point 119 in Fig. 22. The positions of link 110, member 111 and spring 118 when gear 102 is in engagement with gear 100 are shown in full lines in Fig. 22, the corresponding positions being shown in dotted lines for the opposite position in which gear 103 engages gear 101. When the knob 98 is turned to move member 111 from the full line to the dotted line position, it will be noted that spring 118 is stretched as it moves to the right, referring to Fig. 22, until it has passed across pivot 117 of member 111. After this point, the tendency of the spring is to continue the rotation of the member 111 in the same direction, it only being necessary to move knob 98 slightly more than half way from one position to the other, the force of spring 118 completing the movement. Similarly, when the knob is moved in the opposite direction and member 111 returned from the dotted line to the full line position, spring 118 is extended until it has crossed center 117 when it acts to complete the movement and return member 111 to its full line position.

While I have described particular mechanism for the sake of clearness, it is obvious that my invention is not limited to the particular details of construction described, but that various modifications and equiva-

lents may be employed within my invention and within the scope of the appended claims.

Having now described my invention, what I claim and desire to protect by Letters Patent is as follows:—

1. In a phonograph, in combination, a rotatable record support, a reproducer, means for producing a relative feeding movement along a substantially straight line between said reproducer and record support, said means comprising coacting members movable into and out of operative engagement with each other, means for rotating said record support, means for holding the same against rotation, means for latching said last named means in inoperative position, a single controlling member, and connections from said controlling member operable thereby at any desired point in the relative feeding movement between said reproducer and said record support to render said latching means operative or inoperative and to simultaneously cause said coacting members to be respectively engaged with or disengaged from each other, substantially as described.

2. In a phonograph, in combination, a rotatable record support, a reproducer provided with a stylus, said record support being movable with respect to said reproducer in a direction longitudinally of the record support, means for rotating said record support, frictional braking means for holding the same against rotation, a single controlling member, and means controllable by said member at any desired position of said record support relatively to said reproducer to render said braking means inoperative or operative and simultaneously therewith to cause said stylus to be moved respectively into or out of engagement with the surface of a record carried by said record support, substantially as described.

3. In a phonograph, in combination, a rotatable record support, means for rotating the same, a brake band frictionally engaged upon said support and having a lug formed thereon, a stylus adapted to be operatively positioned with respect to a record carried by said support, a member adapted to move into the path of said lug to stop said support, a member adapted to disengage said stylus from said support, and a single controlling member to cause said stopping and disengaging movements of said members, substantially as described.

4. In a phonograph, in combination, a rotatable record support, driving means therefor comprising a member having a cylindrical brake surface, and means for rendering said driving means inoperative, said second named means comprising a device movable with and yieldingly and non-positively connected to said cylindrical surface, and stop-

ping means adapted to engage said device to stop said driving means, substantially as described.

5 In a phonograph, in combination, a rotatable record support, driving means therefor, a member rotatable with said driving means, a brake band encircling the major portion of said member and rotatable therewith, and means adapted to cooperate with said brake
10 band to stop said driving means, substantially as described.

6. In a phonograph, in combination, a rotatable driving member, a record support mounted thereon, a stylus movable into and
15 out of engagement with the surface of a record carried by said support, said driving member having a projection extending therefrom, a member adapted to be moved into the path of said projection to stop the rotation of said record support, means for disengaging said stylus from the record surface, and means comprising a single controlling member for moving said second named
20 member into the path of said projection and for operating said stylus disengaging means, substantially as described.

7. In a phonograph, in combination, a rotatable record support, means for rotating the same, a reproducer provided with a floating weight and a stylus carried thereby, said
30 record support having a lug connected therewith, a member adapted to move into the path of said lug to stop said support, a member adapted to lift said weight to disengage said stylus from the record, and a single controlling means movable to cause the said stopping and lifting movements of said members, substantially as described.

8. In a phonograph, in combination, a rotatable record support, driving means therefor, and means for rendering said driving means inoperative, said second named means comprising a substantially cylindrical brake band movable with said driving means and
45 frictionally held against movement with respect to the same, and means movable into engagement with said brake band to stop said driving means, substantially as described.

9. In a phonograph, in combination, a rotatable record support, driving means therefor, a stylus movable into and out of engagement with the surface of a record carried by said support, braking means movable
55 with said driving means and frictionally held against movement with respect to the same, means adapted to resist movement of said braking means to stop said driving means, means for disengaging said stylus from the record surface, and means for simultaneously causing the operation of said third and fourth named means, substantially as described.

10. In a phonograph, in combination, a
65 rotatable record support, means for rotating

the same, a reproducer provided with a stylus, a traveling carriage carrying said record support, means for progressing the same axially of the record support past the reproducer to produce a relative feed, and
70 means for automatically stopping the rotation of the record support by frictional braking action, stopping the travel of the carriage, and lifting the stylus out of contact with the record at a predetermined point
75 in the travel of the carriage, substantially as described.

11. In a phonograph, in combination, a traveling carriage, a rotatable record support carried thereby, means for rotating
80 said record support, means comprising members movable into and out of engagement with each other for imparting a progressive travel to said carriage, and means for simultaneously stopping the rotation of said
85 record support and moving said members out of engagement with each other at any desired point in the travel of said carriage, said last named means comprising a motion arresting device carried by said carriage, substantially as described.

12. In a phonograph, in combination, a traveling carriage, a rotatable record support carried thereby, means for rotating the same, means for imparting a progressive
95 travel to said carriage, and means for stopping the rotation of said record support automatically or manually, said means comprising motion arresting mechanism carried by said carriage and including a member rotatable with said record support, substantially as described.

13. In a phonograph, in combination, a traveling carriage, a rotatable record support carried thereby, means for rotating the
105 same, means for imparting a progressive travel to the same, and means for stopping the rotation of said record support and the travel of said carriage automatically or manually, said means comprising motion arresting mechanism carried by said carriage and including a member rotatable with said record support, substantially as described.

14. In a phonograph, in combination, a traveling carriage, a shaft carried thereby,
115 a stationary frame, a rotative shaft carried thereby having an operative connection with said first shaft, a record support mounted on said first shaft, a brake member carried by said first shaft, a brake lever carried by said
120 carriage adapted to cooperate with said member to stop the rotation of said record support, and means for operating said lever, substantially as described.

15. In a phonograph, in combination, a
125 traveling carriage, a shaft carried thereby, a record support secured to said shaft, a lug rotatable with said shaft, a pivoted lever carried by said carriage carrying a projection and spring-impelled to move said
130

projection into the path of said lug, a latch for holding said projection out of the path of said lug, and means for tripping said latch, substantially as described.

5 16. In a phonograph, in combination, a traveling carriage, a shaft carried thereby, a record support secured to said shaft, a band carrying a lug and connected to rotate with said shaft, a pivoted lever carried by said
10 carriage carrying a projection and spring-impelled to move said projection into the path of said lug, a latch for holding said projection out of the path of said lug, and means for tripping said latch, substantially
15 as described.

17. In a phonograph, in combination, a traveling carriage, a shaft carried thereby, a record support secured to said shaft, a lug rotatable with said shaft, a pivoted lever carried by said carriage carrying a
20 projection and spring-impelled to move said projection into the path of said lug, a latch for holding said projection out of the path of said lug, means for tripping said latch and a lever carried by said carriage for oper-
25 ating said tripping means, substantially as described.

18. In a phonograph, in combination, a traveling carriage, a shaft carried thereby, a
30 record support secured to said shaft, a member connected with and rotated by said shaft, a pivoted lever carried by said carriage carrying a projection and spring-impelled to move said projection against said
35 member, a latch for holding said projection out of contact with said member, and means carried by said carriage for tripping said latch, substantially as described.

19. In a phonograph, in combination, a
40 traveling carriage, a movable feed nut carried by said carriage, a stationary frame, a feed screw carried thereby with which said nut is adapted to cooperate, spring means for holding said nut in engagement with
45 said screw, means carried by said carriage and comprising a rotatable cam for forcing said nut out of engagement with said screw, spring means for operating said forcing means, a latch for holding said forcing
50 means in inoperative position, and means for tripping said latch, substantially as described.

20. In a phonograph, in combination, a traveling carriage, a pivoted feed nut carried
55 by said carriage, a stationary frame, a feed screw carried thereby with which said nut is adapted to cooperate, spring means for holding said nut in engagement with said screw, means carried by said carriage for forcing said nut out of engage-
60 ment with said screw, spring means for operating said forcing means, a latch for holding said forcing means in inoperative position, a lever for tripping said latch and an
65 abutment contacted by said lever during the

travel of said carriage to operate the lever, said abutment being adjustable to cause said lever to trip said latch at different points in the travel of said carriage, sub-
stantially as described.

21. In a phonograph, in combination, a traveling carriage, a rotatable record sup-
port carried thereby, a rock shaft carried by said carriage, a stationary reproducer
70 having a floating weight, and means for raising and lowering said weight independ-
75 ently of the body of said reproducer from the oscillation of said rock shaft at any point in the travel of said carriage, sub-
stantially as described.

22. In a phonograph, in combination, a traveling carriage, a rotatable record sup-
port carried thereby, a rock shaft carried by said carriage, a stationary reproducer
80 having a floating weight, and a stylus carried
85 thereby, means for raising said weight to place said stylus in inoperative position, means for latching said raising means in inoperative position, and connections from
90 said rock shaft for releasing said raising means from said latching means, substan-
tially as described.

23. In a phonograph, in combination, a traveling carriage, a rotatable record sup-
port carried thereby, a rock shaft carried
95 by said carriage, a stationary reproducer having a floating weight, a bell crank and connections therefrom for adjusting the po-
sition of said weight, and a connection be-
100 tween said rock shaft and bell crank per-
mitting relative movement between the same longitudinally of said shaft for operating the latter from the former, substantially as
described.

24. In a phonograph, in combination, a
105 stationary reproducer having a floating weight, a traveling carriage, a rotatable record support carried thereby, a rock shaft carried by said carriage, a rod secured to
110 said rock shaft and extending longitudinally thereof, a bell crank having a slidable connection with said rod and adapted to be oscillated thereby, and means coacting with
said bell crank to raise said floating weight,
115 substantially as described.

25. In a phonograph, in combination, a support, a reproducer secured thereto and
carrying a stylus having an operative and inoperative position, and means for deter-
120 mining the position of the stylus comprising
a lever pivoted to said support and spring pressed to move said stylus into inoperative position, a link movable to cam said lever
into inoperative position, and means for
125 moving said link, substantially as described.

26. In a phonograph, in combination, a support, a reproducer secured thereto and
provided with a pivoted floating weight, a bell crank pivoted to said support spring-
pressed to raise said weight into inoperative
130

position and having a depending arm with a lug thereon, a link, and means for reciprocating said link to cam said lug against said spring pressure and to release the same, substantially as described.

27. In a phonograph, in combination, a rotatable record support, a reproducer having a floating weight, means comprising a traveling carriage for producing a relative feeding movement between said record support and said reproducer, a rock shaft, means connected thereto for adjusting the position of said weight, braking means carried by said carriage and controlled by said rock shaft for stopping said record support, and a lever movable at will for rocking said shaft in opposite directions, substantially as described.

28. In a phonograph, in combination, a rotatable record support, a reproducer having a floating weight, a rock shaft, a feed screw and a nut movable into and out of engagement with the same, means operated by said rock shaft for positively stopping said record support and moving said nut away from said screw, and means comprising a single member movable at will for rocking said shaft in opposite directions, substantially as described.

29. In a phonograph, in combination, a rotatable record support, a reproducer having a floating weight, a rock shaft, a feed screw and a nut movable into and out of engagement with the same, means operated by said rock shaft for positively stopping said mandrel, moving said nut away from said screw, and lifting said weight, and means comprising a single member movable at will for rocking said shaft in opposite directions, substantially as described.

30. In a phonograph, in combination, a rotatable record support, a shaft therefor, a lug rotating with said shaft, a rock shaft, a lever loosely mounted on said shaft, having a projection thereon, and spring-impelled to move said projection into the path of said lug, a latch for holding said lever with said projection out of the path of said lug, and a lever secured to said rock shaft having a projection thereon adapted to trip said latch, substantially as described.

31. In a phonograph, in combination, a rotatable record support, a shaft therefor, a lug rotating with said shaft, a lever carrying a projection and spring impelled to move said projection into the path of said lug, a latch for holding said lever with said projection out of the path of said lug, and a lever adapted on movement in one direction to trip said latch, and on movement in the opposite direction, to force said first named lever into latched position, substantially as described.

32. In a phonograph, in combination, a traveling carriage, a rotatable record sup-

port, and means carried by said carriage for stopping the rotation of said record support, comprising a pivoted lever carrying a brake lug, spring means impelling said lever to braking position, a spring pressed lever one arm of which is adapted to engage said first lever to latch the same in inoperative position, and means for rocking said second lever to trip said latch, substantially as described.

33. In a phonograph, in combination, a traveling carriage, a rotatable record support, and means carried by said carriage for stopping the rotation of said record support, comprising a pivoted lever carrying a brake lug, spring means impelling said lever to braking position, and a spring pressed lever one arm of which is adapted to engage said first lever to latch the same in inoperative position, and the other arm of which extends beyond said carriage, substantially as described.

34. In a phonograph, in combination, a traveling carriage, feeding means for the same comprising a feed screw and a pivoted feed nut, a rock shaft carried by said carriage and operable to disengage said feed nut from said feed screw to render said feeding means inoperative, means comprising a spring to so operate the rock shaft, and means for latching said last named means against operation, substantially as described.

35. In a phonograph, in combination, a traveling carriage, feeding means for the same comprising a feed screw and a pivoted feed nut, a rock shaft carried by said carriage and operable to disengage said feed nut from said feed screw to render said feeding means inoperative, means comprising a spring to so operate the rock shaft, means for latching said last named means against operation, and means for automatically tripping said latching means when the carriage reaches a predetermined point, substantially as described.

36. In a phonograph, in combination, a traveling carriage, feeding means for the same comprising a feed screw and a pivoted feed nut, a rock shaft carried by said carriage and operable to render said feeding means inoperative, manually operable means to operate the rock shaft at will, means comprising a spring co-acting with said manually operable means to operate the rock shaft, means for latching said last named means against operation, and means for automatically tripping said latching means when the carriage reaches a predetermined point, substantially as described.

37. In a phonograph, in combination, a traveling carriage, feeding means for the same, a rock shaft carried by said carriage and operable to render said feeding means inoperative, spring-impelled means to so op-

erate the rock shaft, means for latching said spring impelled means against operation, and manual means for moving said spring-impelled means into latched position, substantially as described.

38. In a phonograph, in combination, a traveling carriage, feeding means for the same, a rock shaft carried by said carriage and operable to render said feeding means inoperative, spring-impelled means to so operate the rock shaft, means for latching said spring impelled means against operation, and a hand lever attached to said rock shaft for operating the latter independently of said spring-impelled means, substantially as described.

39. In a phonograph, in combination, a rotatable record support, driving means therefor, a reproducer, means for producing a relative feeding movement between said reproducer and said record support, means for rendering said last named means inoperative, braking means movable with said driving means and frictionally held against movement with respect to the same, means adapted to resist movement of said braking means with respect to said driving means, and means for simultaneously controlling the operation of said third and fifth named means, substantially as described.

40. In a phonograph, in combination, a rotatable record support, driving means therefor, and means for automatically rendering said driving means inoperative at a desired point in the reproduction of a record carried by said support, said second named means comprising a substantially cylindrical brake band movable with, and yieldingly and non-positively connected to said driving means, and stopping means adapted to engage said brake band to stop said driving means, substantially as described.

41. In a phonograph, in combination, a rotatable record support, a sound box, means for producing a relative feeding movement

between said sound box and record support, said means comprising coacting members movable into and out of operative engagement with each other, means for rotating said record support, means for holding the same against rotation, means for latching said last named means in inoperative position, a single controlling member, and connections from said controlling member operable thereby at any desired point in the relative feeding movement between said sound box and said record support to render said latching means operative or inoperative and to simultaneously cause said coacting members to be engaged with or disengaged from each other, substantially as described.

42. In a phonograph, in combination, a rotatable record support, a sound box provided with a stylus, means for producing a relative feeding movement between said sound box and record support, said means comprising coacting members movable into and out of engagement with each other, means for rotating said record support, means for holding the same against rotation, means for latching said last named means in inoperative position, a single controlling member, and connections from said controlling member operable thereby at any desired point in the relative feeding movement between said sound box and said record support to render said latching means operative or inoperative and simultaneously therewith to cause said coacting members to be engaged with or disengaged from each other and said stylus to be moved respectively into or out of engagement with the surface of a record carried by said support, substantially as described.

This specification signed and witnessed this 2d day of August 1910.

PETER WEBER.

Witnesses:

DYER SMITH,
H. H. DYKE.

SOUND AMPLIFIER,

#1,220,501-----W.W.Dean,

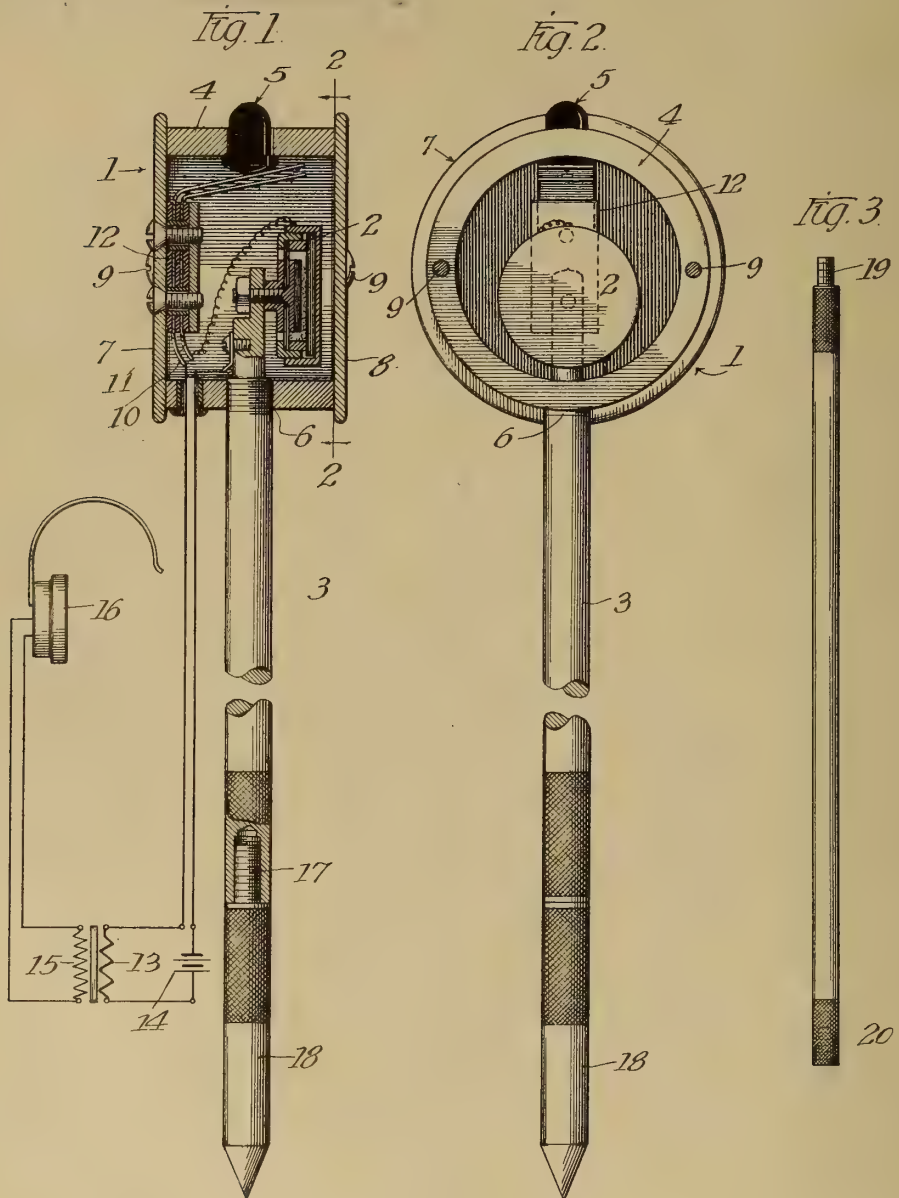
Patented-March 27th, 1917.

Filed-August 28th, 1915.

W. W. DEAN.
SOUND AMPLIFIER.
APPLICATION FILED AUG. 28, 1915.

1,220,501.

Patented Mar. 27, 1917.



Witnesses:
Robert F. Weir
Arthur W. Cartory

Inventor
William W. Dean
By Brown, Hanson & Boettcher
Attys

UNITED STATES PATENT OFFICE.

WILLIAM W. DEAN, OF ROCHESTER, NEW YORK, ASSIGNOR TO STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, OF ROCHESTER, NEW YORK, A CORPORATION OF NEW YORK.

SOUND-AMPLIFIER.

1,220,501.

Specification of Letters Patent.

Patented Mar. 27, 1917.

Application filed August 28, 1915. Serial No. 47,757.

To all whom it may concern:

Be it known that I, WILLIAM W. DEAN, a citizen of the United States, residing at Rochester, in the county of Monroe and State of New York, have invented a certain new and useful Improvement in Sound-Amplifiers, (Case 2^A), of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

The present invention relates to a sound amplifier.

It is a well-known fact that sound travels more readily through an elastic solid than through a gas. I employ this fact in detecting and amplifying sounds that are difficult to perceive. The detector and amplifier which is the subject of the present invention is employed in detecting knocks in engines, sounds indicative of unusual conditions in machinery of all kinds, leaks in pipes, and, in fact vibrations and noises of all kinds.

In the accompanying drawings which form a part of the present specification, and in which I have illustrated the preferred embodiment of my invention,

Figure 1 is a side elevation with the casing shown in section;

Fig. 2 is a front elevation with the casing sectioned on the line 2—2 of Fig. 1; and

Fig. 3 is an elevation of an extension-rod for adjusting the length of the sound-transmitting rod.

I am aware that microphonic devices have been employed to detect and amplify sounds, but, as heretofore constructed, these devices have been cumbersome and constructed on faulty design.

The device shown in the drawings comprises a casing 1, which contains the inertia microphone 2, and the transmitting-member 3, which comprises a jointed rod. The casing 1 comprises a cylindrical shell 4, through the top of which a push-button-member 5 projects and into the bottom of which the upper section of the jointed rod 3 is screw-threaded at 6. The cylindrical casing 4 is closed by end-plates 7 and 8, which are secured in any suitable manner, as by means of the screws 9. A pair of normally-open contact-springs 10 and 11 are mounted in a block of insulation 12, which is secured to one of the end-plates 7. The

springs 10 and 11 have their free ends extending beneath the push-button 5 in such manner that pressure upon the button 5 closes contact between the springs. The upper section of the jointed rod 3 extends into the casing 4 and has secured thereto within the casing 4 the inertia microphone 2, one terminal of which is connected to the spring 11 and the other of which is grounded on the rod 3. The cooperating contact spring 10 is connected, through the primary winding 13 of an induction coil, to the battery 14, the other side of which is connected to the inner electrode of the microphone 2. The secondary winding 15 of the induction coil is connected to a suitable telephone receiver, which may be of the familiar watch-case type, so as to be easily clamped to the ear of the operator. The transmitting-member 3 is composed of a number of sections which are screw-threaded together, as shown at 17, so as to form, for the purpose of sound-transmission therethrough, one continuous rod. The lowermost section 18 is formed of a hardened steel point, so that the rod may be brought into firm molecular engagement with the object from which sound is to be received.

In Fig. 3 I have shown an extension rod, which is provided with a male coupling end 19 and a female coupling end 20, whereby the sound-transmitting member 3 may be made extensible as desired, so as to gain access to remote points.

The casing which surrounds the microphone is preferably made of insulating material, so that the same may safely be grasped by the operator without fear of electrical shock. The button 5 which closes the operating circuit of the device, is so placed that when the hand of the operator pushes the point 18 against the object to be tested, the circuit will be automatically closed to render the device operative. While the casing 1 is secured to the sound-transmitting member 3 so that this member may readily be manipulated by the hand of the operator, there is no connection otherwise between the casing and the microphone 2, so that pressure upon the casing, or knocking the same, as by accidental dropping, will not change the adjustment of the parts.

It will be apparent from the above description that I have provided an efficient and convenient sound-amplifier which em-

bodies marked mechanical and operating features.

What I claim is:

1. In combination, a rod having at one
5 end a hardened steel point, a granular carbon microphone directly connected to the other end of said rod only, a casing secured to said rod independently of said microphone and surrounding said microphone, and
10 a switch for said microphone, said switch being carried by said casing.

2. In combination, a jointed rod comprising a plurality of sections secured end to end, the outermost section having a hardened steel point, a microphone connected to the opposite end of said rod, a casing secured to said rod and surrounding said microphone, a switch in said casing, said switch being operated by act of the operator in
20 pressing the point of the rod against an object.

3. In combination, a rod having a hardened point, an inertia microphone connected to the opposite end of said rod, a casing
25 surrounding said microphone and secured to said rod, and a switch having a projecting member, said member passing through said casing and having its end adapted to be depressed by the hand of the operator in

pressing the point of the rod against an
30 object.

4. In combination, a transmitting-member comprising a rod having screw-threaded sections secured end to end, the outer end of said member comprising a hardened point, 35 an inertia microphone secured to the inner end of said rod, a casing surrounding said microphone and secured to said rod, a normally-open switch in said casing, said switch having an operating member projecting 40 through the top of the casing in position to be depressed by the hand of the operator in pressing the point of the transmitting-member against an object.

5. In combination a rod having at one end 45 a hardened steel point, a granular carbon microphone directly connected to the other end of said rod only, a casing surrounding said microphone but being out of contact therewith, said casing being secured to said 50 rod adjacent the point of attachment of said microphone, said casing being substantially closed and forming a guard against the entry of extraneous noises or vibrations and as a handle for the operator. 55

In witness whereof, I hereunto subscribe my name this 25 day of Aug. A. D. 1915.

WILLIAM W. DEAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

7 110 5
SOUND BOX,
#1,220,638-----A.D. Jones,
Patented-March 27th, 1917
Filed-February 24th, 1914.

A. D. JONES.

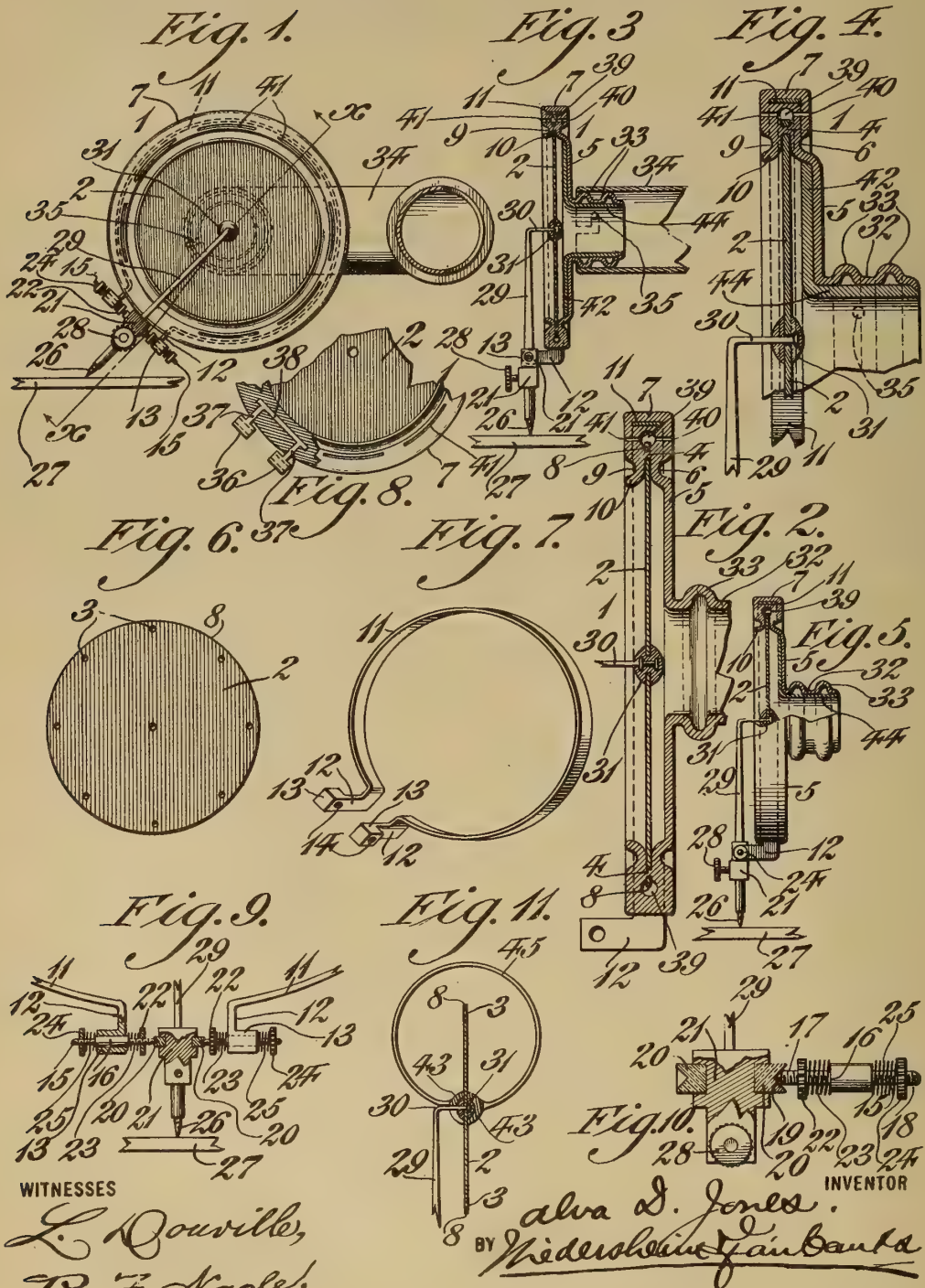
SOUND BOX.

APPLICATION FILED FEB. 24, 1914.

Patented Mar. 27, 1917.

2 SHEETS—SHEET 1.

1,220,638.



WITNESSES

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BY Niederhoffer & Gumbert

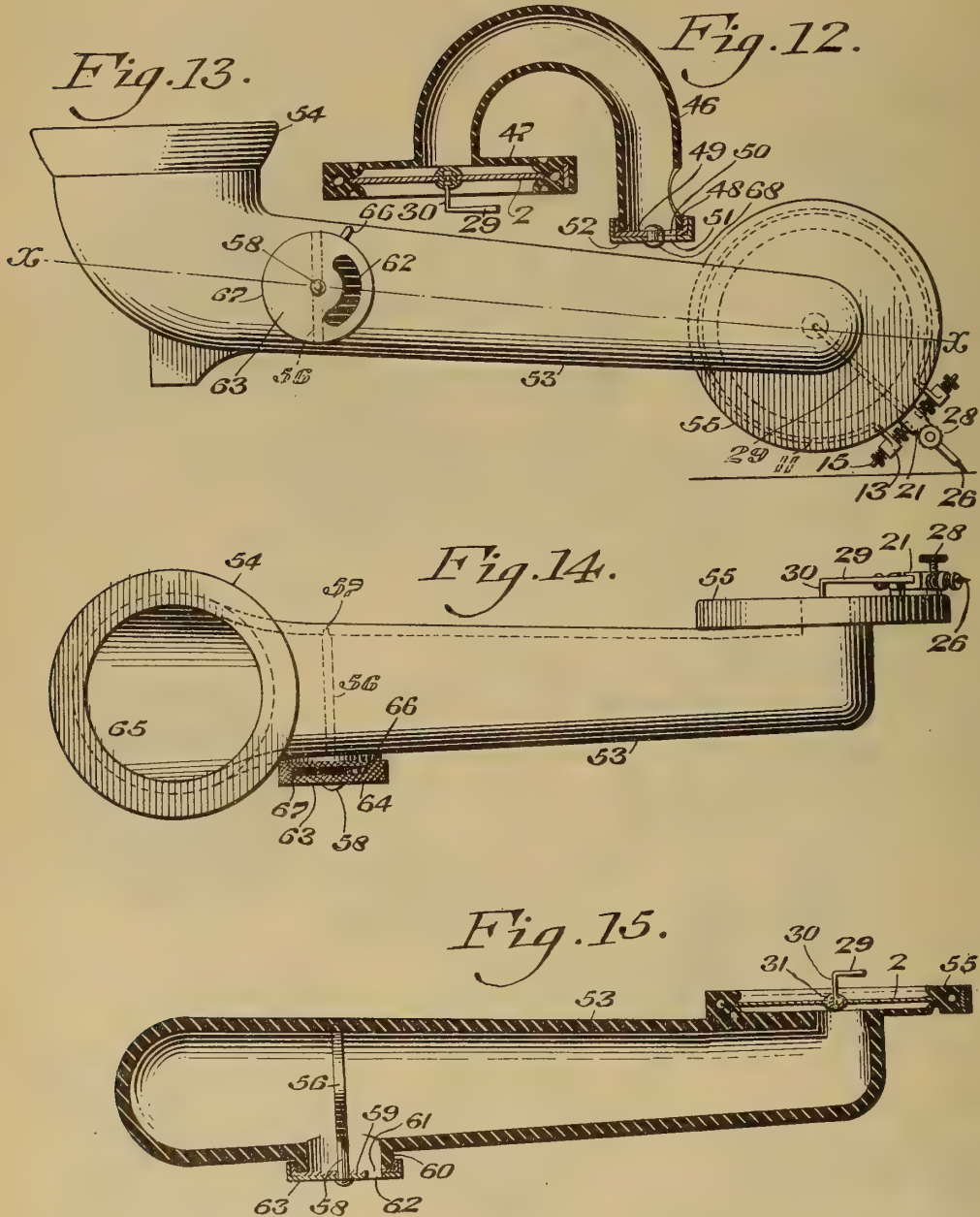
ATTORNEYS

A. D. JONES.
SOUND BOX.

APPLICATION FILED FEB. 24, 1914.

Patented Mar. 27, 1917.
2 SHEETS—SHEET 2.

1,220,638.



WITNESSES

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A. D. Jones. INVENTOR
BY Nichols & Fairbanks ATTORNEYS

UNITED STATES PATENT OFFICE.

ALVA D. JONES, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-FIFTH TO E. HAYWARD FAIRBANKS, OF MERCHANTVILLE, NEW JERSEY.

SOUND-BOX.

1,220,638.

Specification of Letters Patent.

Patented Mar. 27, 1917.

Application filed February 24, 1914. Serial No. 820,643.

To all whom it may concern:

Be it known that I, ALVA D. JONES, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Sound-Box, of which the following is a specification.

In sound boxes for talking machines, as generally constructed, the sound reproducing diaphragm is held in position by one or more detachable annuli of rubber or similar material, and the sound box is composed of a plurality of metallic and rubber parts, united by screws, the various parts having rubber insulation between them; whereby the cost of production is greatly increased.

It is further well known that most sound boxes in use emit a metallic or scratchy sound accompanying the reproduction of sound from the sound reproducing tablet. By my present invention, I construct the sound box of a single body of rubber or similar suitable material, within which I cast, mold or otherwise secure the diaphragm or disk to which the stylus arm of the usual construction is secured, whereby the expense of production is reduced to a minimum, and I obtain a sound box as a whole, which possesses marked advantages over those of the prior art, and wherein the sound box body is composed of a single, integral piece of material.

In carrying out my invention, I simultaneously with the production of the one piece sound box body and the securing of the mica or other diaphragm therein also cast within or to said sound box body, the bearings in which the stylus holder is mounted, and I provide said stylus holder with a novel construction of jeweled bearings by which latter I attain a most faithful and accurate reproduction of the sound to be reproduced or transmitted.

To the above ends, my invention consists of a novel method of producing a sound box, wherein the sound box body is in one piece and has the mica disk or diaphragm cast, molded or otherwise secured thereto, simultaneously with the production of the sound box body, the bearings for the stylus arm being also cast or molded into or upon said body portion at the same time.

It further consists of a novel construction of a sound box having a one piece body of rubber or similar suitable material within

which the mica or other diaphragm is cast or molded, without necessitating the employment of extraneous fastening devices.

It further consists of other novel features of construction, all as will be hereinafter fully set forth.

For the purpose of illustrating my invention I have shown in the accompanying drawings one form thereof which is at present preferred by me, since the same will give in practice satisfactory and reliable results, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown and described.

Figure 1 represents a side elevation of a sound box embodying my invention.

Fig. 2 represents a section on line $x-x$ of Fig. 1.

Fig. 3 represents on a reduced scale, a section similar to Fig. 2, but showing the sound box as applied to the coating element of a talking machine, and the rear inner portion of the sound box being of softer rubber or similar material.

Fig. 4 represents a sectional view of a portion of the sound box seen in Fig. 3 on an enlarged scale.

Fig. 5 represents a sectional view, partly in elevation, showing another modification of my invention.

Fig. 6 represents a front elevation of the mica or other diaphragm employed, in detached position.

Fig. 7 represents, in detached position, a perspective view of a band which may be cast or molded in the sound box body, showing also the lugs for the reception of the bearings of the stylus holder.

Fig. 8 represents a sectional view, partly in elevation, showing a slightly different form of securing or casting the bearings for the stylus holder in the sound box body.

Fig. 9 represents a front elevation on an enlarged scale, showing one manner of mounting the bearings for the stylus holder, whereby a very delicate and sensitive reproduction of the sound waves may be produced.

Fig. 10 represents on an enlarged scale, a front elevation of a portion of the stylus holder and its adjuncts, seen in Fig. 9,

Fig. 11 represents a sectional view of the diaphragm and its adjuncts showing the manner of securing the stylus holder to said diaphragm. Fig. 12 represents a sectional view of another embodiment of my invention. Fig. 13 represents a side elevation of a modification. Fig. 14 represents a plan view of Fig. 13. Fig. 15 represents a section on line $x-x$, Fig. 13. Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings:

1 designates my novel construction of sound box, the same comprising a one piece body portion and the diaphragm 2, having the ports 3 therethrough, through which ports the rubber or other plastic material of the sound box body is adapted to pass or interlock during the action of molding and become set, as indicated at the points 4 in Figs. 2 and 4. 5 designates the rear wall of the one piece sound box body which has an outer, annular, peripheral groove or indentation 6, formed during the action of molding or by the action of the molds, said sound box having the outer peripheral solid portion 7, which surrounds the outer peripheral edge 8 of the diaphragm 2, and is continued around said outer periphery of the diaphragm and is annularly deflected as at 9, so as to terminate in the outwardly projecting lip 10, the outer periphery of the diaphragm being pinched between the members 6 and 9, as will be understood from the enlarged views in Figs. 2 and 4. Simultaneously with the casting of the body portion of rubber or other similar material around the diaphragm 2, I also cast or mold in position the band 11, best seen in Fig. 7, which is provided at its terminals with the outwardly projecting arms 12, which terminate in the bearings 13, having the openings 14 therein, in which openings are mounted the smooth portions 16 of the stems 15, the latter having the threaded portions 17 and 18, said portion 17 terminating in a conical point 19, which is received in the jeweled bearing or block 20, inserted in the block or stylus holder 21.

22 designates a nut engaging the threaded portion 17, whereby the tension of the spring 23 can be adjusted, according to requirements. 24 designates an outer nut engaging the threaded portion 18, whereby the tension of the spring 25 can be adjusted, according to requirements. The block or stylus holder 21 is adapted to receive the chuck or stylus 26 in the usual manner which engages the groove of the tablet 27 in the customary manner, the stylus or the stylus chuck being held in position by a screw 28 of the usual construction.

The stylus arm 29 projects upwardly from the stylus block 21 and has its upper extremity deflected laterally as at 30 and

suitably secured to the diaphragm 2, as indicated at 31, by any suitable cementing or fastening means, so that no metal contacts with the diaphragm 2. During the operation of casting the sound box body, I also cast the laterally extending neck or tubular extension 32 thereon, and provide the same with the ridges 33, which are adapted to engage the tubular extension 34 of the tone arm, as will be understood from Fig. 3, and I also provide the pin 35 to form the bayonet joint connection with the extension or tone arm 34 of the usual construction.

If desired, I may employ in lieu of the construction seen in Fig. 7, for producing the bearings for the stylus arm, the construction seen in Fig. 8, which shows the bearings 36 as mounted on arms 37 connected by the bar 38, said bar and arms being cast in the sound box body simultaneously with the casting of the diaphragm 2 therein, as will be understood from said Fig. 8.

In all the embodiments of my invention, it will be seen that the front, rear and outer peripheral portion of the sound box body is of one piece and composed of a single mass of rubber or similar material which during the process of casting or molding is properly shaped to produce the construction seen in Fig. 2, and has its outer portions compressed during molding upon the outer portions of the diaphragm 2. All screws, metal plates, washers, packings for the diaphragm and the like are dispensed with, my novel sound box body being made integral or in one piece and comprising merely the body itself with the diaphragm and bearings for the stylus holder cast therein at one and the same operation.

It will be further apparent that during the casting of the diaphragm, the plastic material of which the sound box body is composed, will be caused to enter the openings 3 in the outer periphery in the diaphragm 2 at the points 4, so that the outer periphery of said diaphragm will be properly and intimately interlocked with the sound box body, as indicated at the points 4 best seen in Figs. 2 and 4. In Fig. 5 is illustrated a partly sectional view of the sound-box, in which the diaphragm is illustrated as without the perforations near its periphery and with the diaphragm simply secured between the contiguous portions of the sound-box.

The body of the sound-box has an annular channel, 39, in its peripheral wall, into which the edge of the diaphragm extends, and segmental slots, 40 and 41, are formed in the front and back of the body which lead into said channel, to provide means for removing the core forming the channel and to lighten the weight of the sound-box whereby the core can be readily

removed, if desired, during or after the act of casting. The stylus arm 29 can be assembled with respect to the diaphragm at any desired stage during or prior to the production or casting of the sound box body by the molding jaws 43, which are mounted on the curved spring 45, said jaws shaping and securing the fastening material 31 in position. The bearings 20 which I employ, seen in Figs. 9 and 10 are preferably jewel bearings, which can be inserted in the block or stylus holder 21 in any convenient way, so that upon the proper adjustment of the nuts 22 and 24, the desired tension of the springs 23 and 25 on both sides of the stylus holder can be obtained, so as to cause a most delicate and faithful reproduction of the sounds desired to be reproduced. In casting my novel construction of sound box, I preferably employ rubber or similar suitable rubber composition which can be cured or vulcanized to the requisite degree of hardness or resiliency, as will be apparent to those skilled in the art, and if desired, I may, at any suitable stage of the production of my novel one piece sound box, make the rear inner wall of the same of material 42, as best seen in Fig. 4, which may be softer than the sound box body, whereby a reproduction of sounds similar to the sounds made by the human throat, of great fidelity, may be had. The lining 42 may be continued to form the sleeve 44, and the interlocking pin 35 may be secured to the sleeve 44 or to the inclosing tubular extension 32, as may be desired.

In carrying out my invention, I do not desire to be limited to any particular construction of molds, for the production of the sound box body, as the same may be of any suitable construction and will form the subject-matter of a separate application, the office of said molds being to retain and compress the rubber or other plastic material, of which the sound box body is composed, with respect to the diaphragm 2, so that the resultant shape of the body will appear as seen in Fig. 2 and the material of the sound box body will simultaneously encompass and interlock with the ports 3 of the diaphragm, as already described, the stylus arm bearings of the metal band 11 or the equivalent construction seen in Fig. 8, being simultaneously cast or molded within the sound box body at the same time the latter is molded around the diaphragm 2.

In the molding or casting of my novel sound box, the rubber or similar material, in a sufficiently plastic condition, is placed within suitable molds, which latter may be made so as to facilitate the proper manipulation, the molds being of such contour that after the same are assembled, the rubber or other material can be compressed into the desired shape, and thereafter cured or other-

wise treated, so that the resultant product when withdrawn from the molding apparatus will be a one-piece, unitary sound box having the advantages described. So far as I am aware, I am the first in the art to produce a sound box having a one-piece sound box body of rubber or similar material cast around and into operative engagement with the diaphragm, and I am also the first to carry out the steps of my novel method herein disclosed, and my claims are therefore to be interpreted with the corresponding scope which is accorded to a pioneer or primary invention.

It will be apparent to those skilled in the art, that by my novel invention I have greatly reduced the number of parts and by a single operation am enabled to produce a one piece sound box body within which is secured and inclosed simultaneously at the one and same operation of molding or casting both the diaphragm and the bearings for the stylus arm and its adjuncts. My invention will also be applicable to telephone receivers and sound recording devices as well as sound boxes or the like.

In the construction seen in Fig. 12, I have shown another embodiment of my invention, wherein the sound box and the goose neck applicable to the well-known Victor type of talking machine are cast or molded in one piece out of rubber or similar material, in lieu of the plurality of parts at present employed. In Fig. 12, 46 represents a goose neck or return bend, and 47 the sound box body, which is cast simultaneously with the curved or return bend portion 46, and has secured therein, the diaphragm 2, the construction of the sound box body and the manner of assembling it with respect to the diaphragm being the same as already described with reference to Figs. 1 and 2, it being understood that the bearings for the stylus holder are cast in the sound box 47 in the same manner as already described with reference to Figs. 7 and 8, and that I also employ in the construction seen in Fig. 12, the construction of bearings seen in Figs. 9 and 10. I close the end 48 of the goose neck seen in Fig. 12 by means of a plate 49, having a port 50 therethrough, which is adapted to register with the port 51 in the plate 52, which turns upon the bearing 68, the construction being such that the plate 49 is fast or stationary upon the extremity of the goose neck 48, while the plate 52 can be turned thereon so as to bring the ports 50 and 51 into or out of alinement, as may be desired, thereby increasing or diminishing the sound reproduced from the diaphragm 2 at the will of the operator. By the employment of the construction seen in Fig. 12, it will be apparent that I combine in a single structure the return bend member and the sound box member, which have

heretofore generally been made detachable or in a plurality of parts, so that in my construction, the cost of manufacture is greatly simplified and reduced to a minimum.

In the construction seen in Figs. 13, 14 and 15, I show my invention in its broad aspects as applied to the tapering arm of a Columbia talking machine, wherein the tapering tone arm 53 is provided with the bell-shaped head 54 of the usual construction, said tone arm terminating at its opposite end in the sound box body 55, which is cast or molded as an integral member with the said tone arm, as will be understood from Fig. 15, said sound box body having the diaphragm 2 and ring 11 seen in Fig. 7 molded therein in the same manner as already described, and provided with the stylus arm 29 and the stylus holder 21 and the stylus 26 of the same character as already described with reference to Figs. 9 and 10, so that I deem it unnecessary to repeat the description thereof. The tapering tone arm 53, the sound box body 55 and the diaphragm 2 may be cast in one piece from rubber or other similar material by molds of any suitable description, as will be apparent to those skilled in the art, and I do not therefore desire to be limited to any form of mold for their production.

In order to regulate the volume of sound created by the vibrations of the diaphragm 2, I employ in the construction seen in Figs. 13, 14 and 15, a valve 56, which I locate in the larger portion of the tone arm, and provide the same at one end with a pintle 57, and at its opposite end with a stem 58, which passes through a plate 59, which is secured to the boss 60 in any suitable manner, and is provided with the port 61 therein, adapted to register with the port 62 of the finger piece 63, which may be knurled as indicated at 64. It will be understood that the closure or plate 59 is fast on the boss 60, while the movable member 63 freely rotates thereon and has connected therewith the stem 58 in such a way that the rotation of the plate 63 will cause the rotation of the stem 58 and the valve 56, so that the latter can be set at any desired point so as to increase or diminish the volume of the sound through the outlet opening 65. If desired, I may secure the pin 66 to the stationary apertured member 59 and permit the same to project through the slot 67 in the flanged or knurled portion 64 of the movable member 63, so that by turning said movable member 63 into one or the other of its extreme positions, the controlling valve 56 will be in open or closed position, according to requirements. By locating the valve 56 in the position shown in Figs. 13, 14 and 15 and employing the port controlling device 63, it will be apparent that the regulation of

the volume of sound will be effected in a most efficient manner, and the shutters or doors in the front of the talking machine cabinet now generally employed may be dispensed with entirely, if desired.

I desire to call special attention to the manner in which I secure the stylus arm 29 to the diaphragm 2, as indicated at 31 in Figs. 2 and 15, since it will be apparent from these figures that by embedding the terminus 30 of the stylus arm in cement or similar material 31 in the manner indicated in said Figs. 2 and 15, I am enabled to make the desired connection with the diaphragm in such a way that there is no contact of the metal of the stylus arm with the diaphragm, whereby reproduction of any scratchy or metallic sounds is entirely obviated or reduced to a minimum. In all the embodiments of my invention, as seen in Figs. 2, 12 or 15, it will be apparent that I have greatly simplified and cheapened the construction, and have done away with the surplus number of parts heretofore employed.

It will now be apparent that I have devised a novel and useful construction of a sound box which embodies the features of advantage enumerated as desirable in the statement of the invention and the above description, and while I have, in the present instance, shown and described a preferred embodiment thereof which will give in practice satisfactory and reliable results, it is to be understood that the same is susceptible of modification in various particulars without departing from the spirit or scope of the invention or sacrificing any of its advantages.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. The herein described method of producing a sound box, which consists in assembling a diaphragm with respect to a body of plastic material, causing the outer portions of said material while in a plastic condition to inclose and engage the outer, front and rear surfaces of said diaphragm, whereby the latter is secured to said body during the act of casting and simultaneously casting the bearings for the stylus arm on said sound box body.

2. The herein described method of producing a sound box, which consists in assembling a sound box diaphragm with respect to a body of plastic material, and next causing outer portions of said plastic material to be compressed and be cast around the outer peripheral portions and front and rear surfaces of said diaphragm, whereby the latter becomes engaged with said body during the act of casting the latter.

3. The herein described method of producing a sound box, which consists in pro-

ducing the rear wall, outer peripheral and front portions of the sound box body, in a single operation and causing said sound box body to be cast through and to be inter-
 5 locked at intervals with the outer peripheral portions of the diaphragm in one and the same casting operation.

4. The herein described method of producing a sound box, which consists in casting the rear wall, outer peripheral and front portions of the sound box body, and a rearwardly extending neck in a single operation, and causing portions of said sound box body to be interlocked with and at intervals to pass through the outer peripheral portions of the diaphragm in one and the same casting operation.
 10 15

5. The herein described method of producing a sound-box, which consists in producing the rear wall, outer peripheral and front portions and the rearwardly extending neck of the sound-box body in a single operation while casting said sound-box body around the outer peripheral portions of a sound-box diaphragm and simultaneously therewith casting on said sound-box body the bearings for the stylus arm.
 20 25

6. As an improved article of manufacture, a sound box for talking machines, comprising a diaphragm, a one piece body portion of rubber or other similar material cast around and inclosing the outer portions of said diaphragm and interlocked therewith, and bearings for a stylus arm also cast in said body portion.
 30 35

7. As an improved article of manufacture, a sound box for talking machines comprising a diaphragm, and a one piece body portion of rubber or other similar material inclosing said diaphragm and interlocked therewith and comprising front, peripheral, and rear walls and a rearwardly extending neck portion, and stylus arm bearings also cast on said body portion.
 40 45

8. As an improved article of manufacture, a sound box for talking machines, comprising a diaphragm, and a one piece body portion of rubber or other similar material cast around and inclosing the outer peripheral portion of said diaphragm and interlocked therewith.
 50

9. As an improved article of manufacture, a sound box body cast of one piece of material, in combination with a diaphragm cast therein, and constituting therewith a unitary structure.
 55

10. As an improved article of manufacture, a sound box body cast of one piece of material, and having bearings for a stylus

arm also cast on said body, in combination with a diaphragm cast in said body and constituting therewith a unitary structure. 60

11. As an improved article of manufacture, a sound box body having a rearwardly extending neck, both being cast from a mass of rubber, in combination with a diaphragm cast in said body and constituting therewith a unitary structure. 65

12. The method of making a sound box, which consists in casting a sound box body around and into operative engagement with a diaphragm. 70

13. The method of making a sound box, which consists in casting a sound box body from a mass of rubber around and into operative engagement with a diaphragm. 75

14. The method of making a sound box which consists in casting a sound box body from a mass of rubber and simultaneously therewith interlocking a diaphragm with the sound box body. 80

15. In a diaphragm mounting, the combination with a mica diaphragm, of a holding ring of hard rubber vulcanized in place upon the periphery of said diaphragm so as to firmly embrace the same and form a secure mounting therefor. 85

16. In a diaphragm mounting, the combination with a mica diaphragm having perforations adjacent its peripheral edge, of a holding ring of hard rubber vulcanized in place upon the periphery of said diaphragm so as to firmly embrace the same and form a secure mounting therefor, said holding ring having integral portions from both sides of said diaphragm extending through the perforations of the periphery of said diaphragm. 90 95

17. In a diaphragm mounting, the combination with a mica diaphragm having perforations adjacent its peripheral edge, of a holding ring of hard rubber vulcanized in place upon the periphery of said diaphragm so as to firmly embrace the same and form a secure mounting therefor, said holding ring having portions of equal thickness at both sides of said diaphragm and having integral portions extending from said side portions through the perforations of the periphery of said diaphragm. 100 105 110

18. As an article of manufacture, a diaphragm of flexible material surrounded at its edge by a mounting ring of rubber vulcanized to such diaphragm.

ALVA D. JONES.

Witnesses:

E. HAYWARD FAIRBANKS,

C. D. McVAY.

PHONOGRAPH TABLE,
#1,220,967-----A.Epri,
Patented-March 27th, 1917.
Filed-June 5th, 1916.

1,220,967.

A. EPRI.
PHONOGRAPH TABLE.
APPLICATION FILED JUNE 5, 1916.

Patented Mar. 27, 1917.
2 SHEETS—SHEET 1.

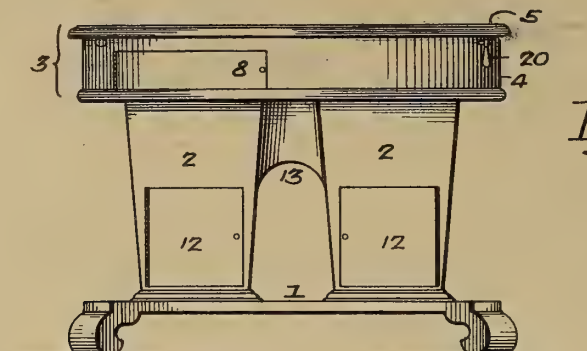


Fig. 1.

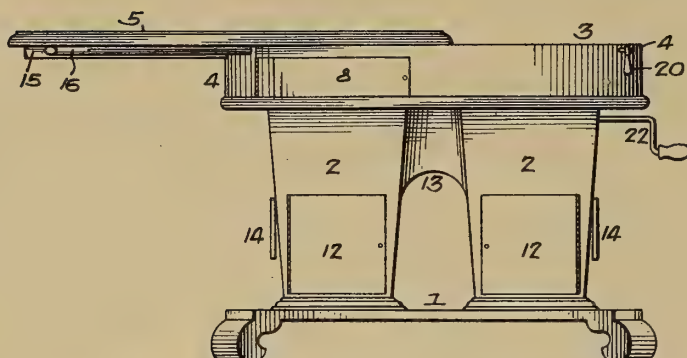


Fig. 2.

Fig. 3.

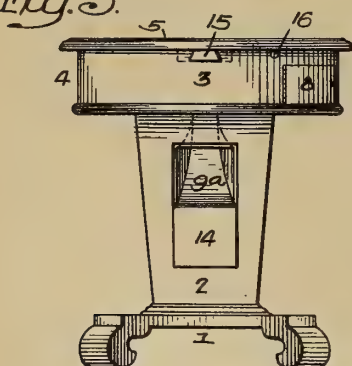


Fig. 8.

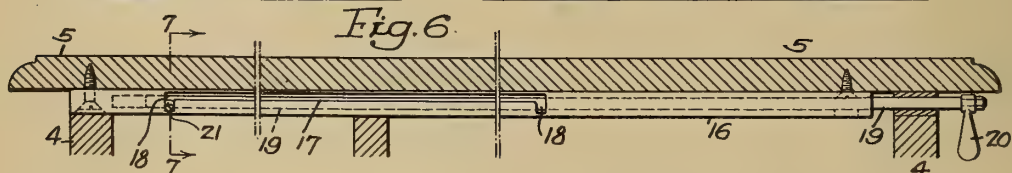
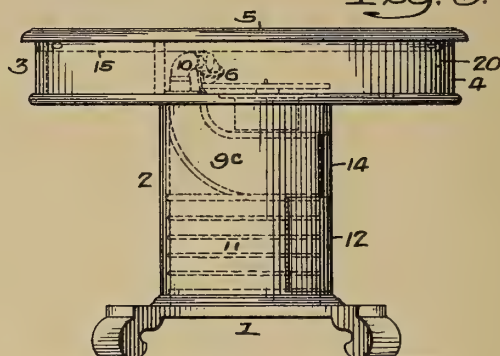


Fig. 6.

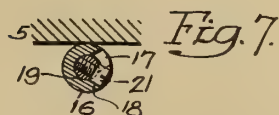


Fig. 7.

Inventor—
Albarr E. Pri.
by his Attorneys—
Howen & Howen

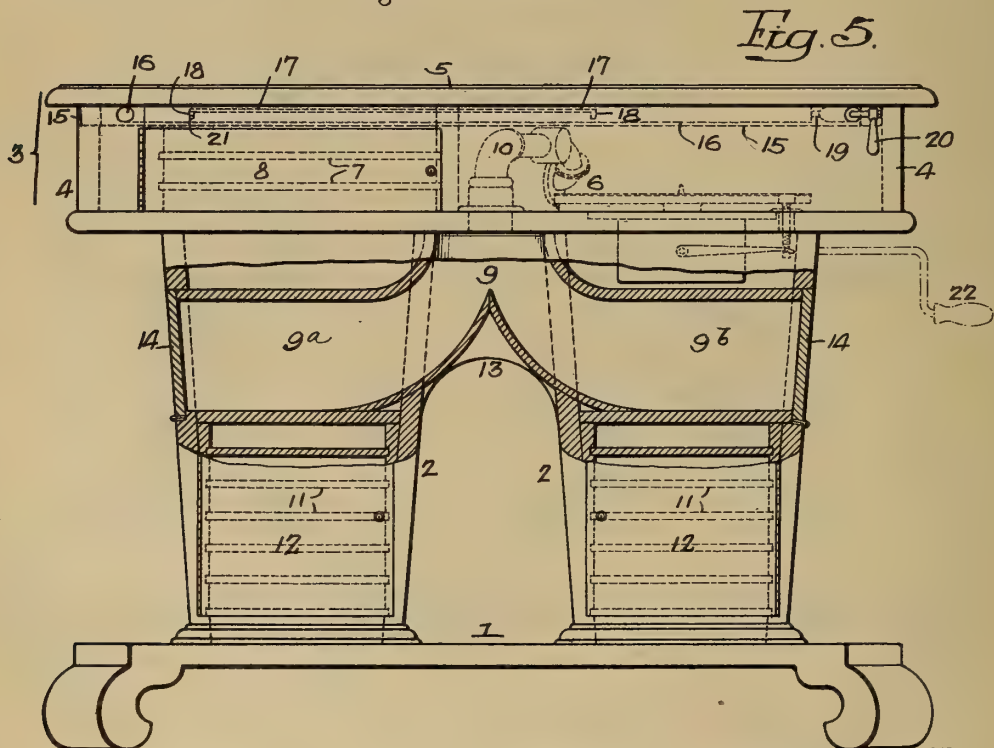
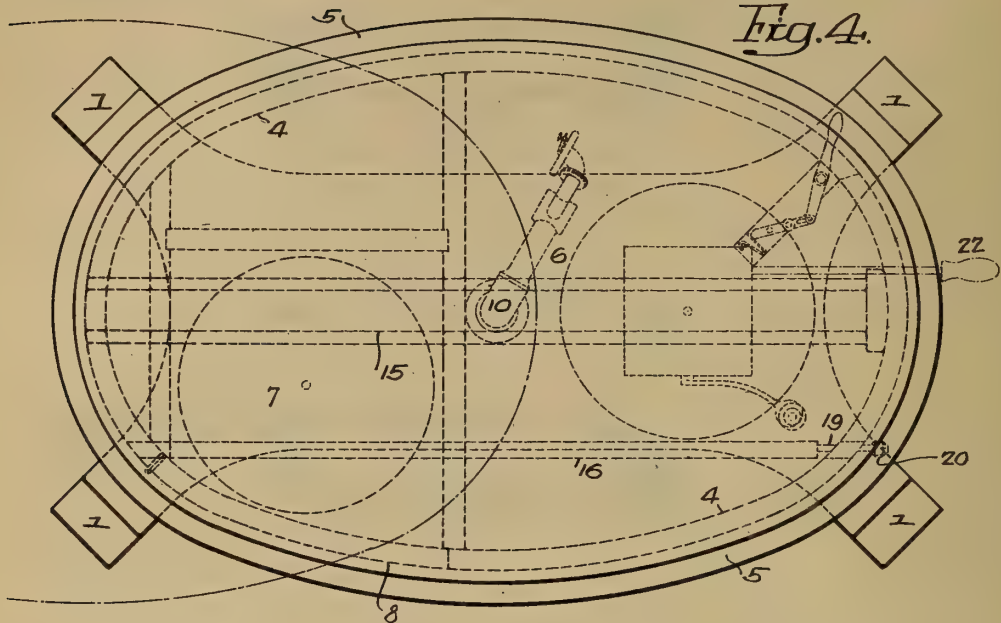
A. EPRI.
PHONOGRAPH TABLE.

APPLICATION FILED JUNE 5, 1916.

1,220,967.

Patented Mar. 27, 1917.

2 SHEETS—SHEET 2.



Inventor—
Albert E. Pri.
by His Attorneys—
Howson & Howson

UNITED STATES PATENT OFFICE.

ALBART EPRI, OF PHILADELPHIA, PENNSYLVANIA.

PHONOGRAPH-TABLE.

1,220,967.

Specification of Letters Patent.

Patented Mar. 27, 1917.

Application filed June 5, 1916. Serial No. 101,847.

To all whom it may concern:

Be it known that I, ALBART EPRI, a subject of the King of Italy, and a resident of Philadelphia, county of Philadelphia, State of Pennsylvania, have invented certain Improvements in Phonograph-Tables, of which the following is a specification.

One object of my invention is to so construct an ornamental center table that a phonograph can be located within the table, and to provide for the sliding of the top of the table to one side to expose the phonograph without disturbing the articles on the table.

A further object is to utilize the legs of the table for inclosing the horn of the phonograph.

A still further object is to provide means for holding the records of the phonograph in the table.

In the accompanying drawings:—

Figure 1, is a side view of my improved table with the top in the closed position;

Fig. 2, is a similar view showing the top moved to one side to expose the phonograph;

Fig. 3, is an end view of the table shown in Fig. 1;

Fig. 4, is a plan view, drawn to an enlarged scale, of the table showing the phonograph in dotted lines;

Fig. 5, is a side view, partly in section, showing the phonograph in dotted lines and the horns in full lines;

Fig. 6, is a longitudinal sectional view showing the method of arranging the sliding top;

Fig. 7, is a section on the line 7—7, Fig. 6; and

Fig. 8, is a view of my invention used in connection with a table having a single pedestal.

1 is the base of the table, which may be ornamented in any suitable manner. 2, 2 are the pedestals which support the upper section 3 of the table; this upper section 3 has a deep apron 4 and a top 5. The upper section 3 of the table is hollow and is of such a depth that it will receive a phonograph, such as illustrated at 6, Fig. 5, and shelves 7 for large record disks, also shown in dotted lines, Fig. 5.

In the present instance, on one side of the upper section is a hinged door 8 so that on opening the door the records can be removed.

In Fig. 1, I have shown two pedestals sup-

porting the top section, while in Fig. 8, I have illustrated a single pedestal. These pedestals are of such a size as to accommodate a sound amplifying member such as the horn 9 of the phonograph. Where two pedestals are used I prefer to divide the horn, as in Fig. 5, having branches 9^a and 9^b extending through the upper portions of the pedestals. The horn connects with the sound arm 10 of the phonograph in the ordinary manner.

The space below the horns in each pedestal may be used for containing the records, as indicated at 11; suitable doors 12 being provided which can be opened so that any of the records can be removed from the shelves illustrated in the drawings.

The pedestals are preferably made square and the size of the pedestals will depend greatly upon the size of the records used in connection with the phonograph.

In some instances, as in Fig. 8, the horn may be located wholly within a single pedestal, as at 9^c, and if two pedestals are used, the other pedestal may be made to accommodate records for the whole height, but I prefer the construction illustrated in Fig. 5, where the horn is divided, part extending through one pedestal and the other extending through the other pedestal.

In Figs. 1 and 5, a central web 13 is shown which connects the two pedestals and also incloses the narrow portion of the horn.

Any suitable cover 14 may be used to close the mouths of the horns, and this cover may be hinged and adjusted in any position desired to regulate the volume.

In order to expose the phonograph without disturbing the articles on the table top, I provide means for sliding the table top to the position illustrated in Fig. 2, so as to expose the phonograph located directly above the right hand pedestal, in the present instance. The table top 5 has an undercut longitudinal rib 15 adapted to slide in a groove in the portion 4 of the upper section 3, as clearly illustrated in Figs. 2, 3 and 6, and secured to the underside of the table top 5 is a tube 16 having a slot 17 therein connecting with notches 18 at each end, as shown clearly in Fig. 6, and adapted to this tube is a rod 19 having a handle 20 beyond the apron 4 at one end of the table and having a pin 21 at the opposite end extending into the slot 17.

By this construction the handle 20 can be turned so as to move the pin out of one of the notches 18 and then drawn out until it comes opposite the other notch, when it can be turned and locked, and by forcing the rod in it will carry the table top with it from the closed position, Fig. 1, to the open position, Fig. 2, and, when it is desired to close the table, the rod can be pulled out carrying with it the top to the closed position, after which the rod can be turned and pushed in to the position illustrated in Fig. 6. Thus the top is moved entirely by the rod and the rod does not project beyond the edge of the table top when the top is in the closed position.

The handle 22 of the phonograph is made detachable and can be located in the upper section of the table when not in use.

By the above construction, it will be seen that I can provide a table which can be used in a parlor or other room and, when closed, has all the appearance of an ordinary center table and, when it is desired to use the phonograph contained in the table, all that is necessary is to operate the handled rod 19 to slide the top to one side without disturbing the articles carried by the table so as to expose the phonograph, and the records can be taken out from the side of the pivoted section of the table or from the pedestals, as desired, and when it is wished to discontinue the use of the phonograph the handle can be again pulled out so as to slide the top back to its original position.

I claim:—

1. The combination of a table adapted for use as a carrier for a phonograph; and having a base, a pedestal, an upper section provided with a movable top, said upper section being adapted to receive a phonograph, and a downwardly extending sound amplifying

member for connection with the phonograph and located in the pedestal.

2. The combination in a table, of a base, two pedestals, an upper section, said section being arranged to receive a phonograph, a sliding top for the upper section, and a downwardly extending sound amplifying member arranged to be connected with the phonograph and provided with two branches, one branch being located in one pedestal and the other branch being located in the other pedestal.

3. The combination in a table, of a base, two pedestals, a hollow upper section having a sliding top and arranged to receive a phonograph in a portion thereof, the other portion of the upper section being arranged to receive records, a sound-amplifying member adapted for connection with the phonograph and extending down through the center of the upper section and extending laterally through each of the pedestals.

4. The combination in a table, of a base, two pedestals, a hollow upper section having a sliding top, one-half of the upper section being arranged to receive a phonograph and the other half being arranged to receive records, a sound-amplifying member adapted for connection with the phonograph and located centrally at the upper section and extending through each of the pedestals, the lower portions of the pedestals being hollow for the reception of phonograph records.

5. The combination in a table, of a pedestal, a hollow upper section having a sliding top, guides for the top, a slotted tube notched at each end of the slot and secured to the top of the table, an operating rod having a pin arranged to travel in the slot and engage either notch.

In witness whereof I affix my signature.

ALBART EPRI.

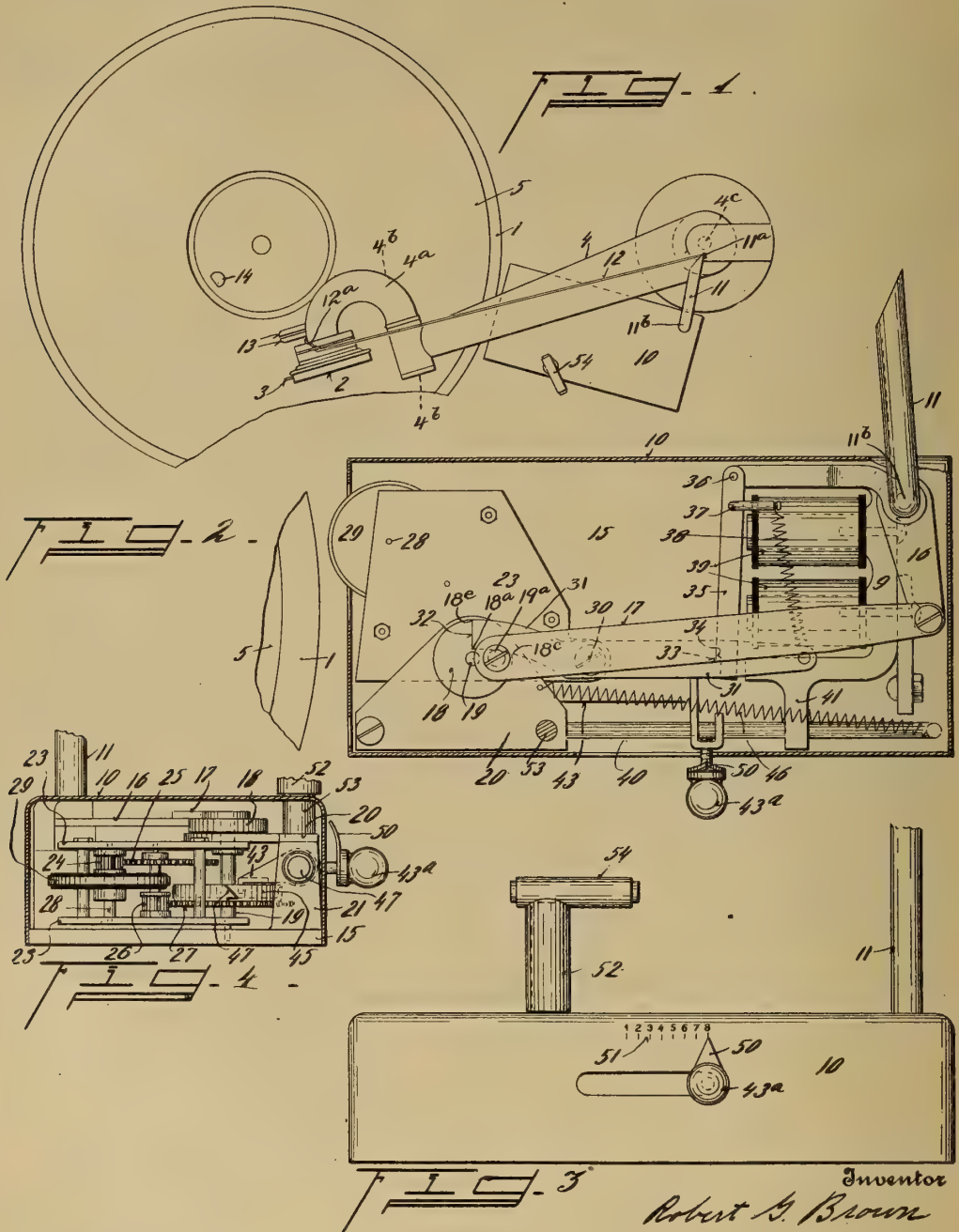
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

SOUND REPRODUCING MACHINE,
#1,221,003-----R.G.Brown,
Patented-March 27th, 1917.
Filed-January 18th, 1915.

R. G. BROWN.
SOUND REPRODUCING MACHINE.
APPLICATION FILED JAN. 18, 1915.

1,221,003.

Patented Mar. 27, 1917.
2 SHEETS—SHEET 1.



Witnesses

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Emma Spencer

Inventor

Robert G. Brown

By

Wood & Wood.

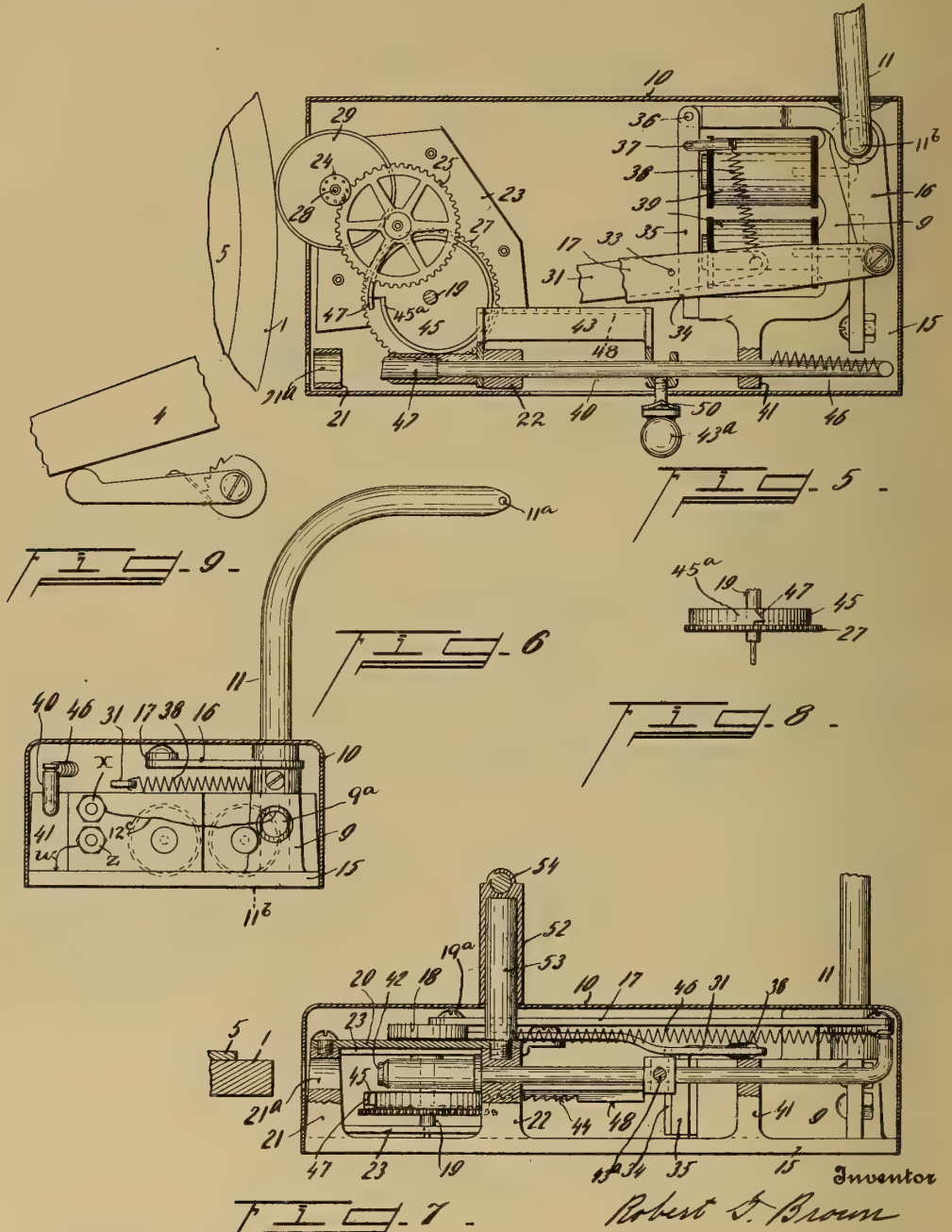
Attorney



R. G. BROWN.
SOUND REPRODUCING MACHINE.
APPLICATION FILED JAN. 18, 1915.

1,221,003.

Patented Mar. 27, 1917.
2 SHEETS—SHEET 2.



Witnesses

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Emma Spener

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Robert S. Brown

By *Ward & Ward*

Attorney

UNITED STATES PATENT OFFICE.

ROBERT G. BROWN, OF CINCINNATI, OHIO, ASSIGNOR TO JOHN E. STRIETELMEIER, OF CINCINNATI, OHIO.

SOUND-REPRODUCING MACHINE.

1,221,003.

Specification of Letters Patent.

Patented Mar. 27, 1917.

Application filed January 18, 1915. Serial No. 2,834.

To all whom it may concern:

Be it known that I, ROBERT G. BROWN, a citizen of the United States, and residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and useful Improvement in Sound-Reproducing Machines, of which the following specification is a full disclosure.

This invention relates to mechanisms for automatically re-playing any given record on a phonograph and it more particularly attempts to reduce such mechanisms to a high state of mechanical simplicity; especially to an extent such that they may be embodied in the form of an attachment easily applied to a conventional phonograph.

The object of this invention is to provide a mechanism adapted first to be set in operation by being connected with the motor and then after a predetermined time interval to in turn automatically withdraw from the same.

The primary object is to provide a mechanism that will very effectively enable a given record to be automatically replayed as many times as desired and then to automatically disconnect the machine from the source of power.

Another object is to provide a unitary self-contained mechanism which can be easily applied to a conventional type of phonograph and which will render the same automatic to the extent of enabling it to replay a record any predetermined number of times and then automatically discontinue the operation of the machine after normalizing its parts.

An object of the herein illustrated specific embodiment of this invention is to provide a mechanism that will normally be entirely free from the turn-table, but which by an appropriate electrical or mechanical latch will be thrown into engagement with said turn-table so as to derive motion therefrom and to utilize this motion for resetting the tone-arm and finally for automatically again disconnecting from the turn-table.

Another object is to utilize a lever fulcrumed at two or more points and constructed to swing about its one fulcrum to effect a re-latching of the trip-mechanism, and

then to utilize its other fulcrum in disconnecting the transmission mechanism.

A further object of this invention is to provide an attachment embodying an electrical or mechanical trip effective at the conclusion of a record to throw a certain operating-mechanism into action, preferably by turn-table power, so as to lift the stylus and replace it at the beginning of the record, and to combine said mechanism with means for automatically effecting a disconnection from the turn-table, and also with an adjusting instrumentality capable of determining the number of such re-playing operations.

Other objects will be in part obvious from the annexed drawings and in part indicated in connection therewith by the following analysis of this invention.

This invention accordingly consists in the features of construction, combination of parts and in the unique relations of the members and in the relative proportioning and disposition thereof; all as more completely outlined herein.

To enable others skilled in the art so fully to comprehend the underlying features thereof that they may embody the same by the numerous modifications in structure and relation contemplated by this invention, drawings depicting a preferred form have been annexed as a part of this disclosure, and in such drawings, like characters of reference denote corresponding parts throughout all the views, of which:—

Figure 1 is a plan view diagrammatically illustrating a conventional sound-arm, record and turn-table with my invention as an attachment applied thereto. Fig. 2 is an enlarged plan of a mechanism embodying my improvement. Fig. 3 is a front elevation thereof. Fig. 4 is a left-end elevation with the casing in section. Fig. 5 is a plan, similar to Fig. 2, showing the transmission unit in its tripped motion-receiving position, and showing some of the parts broken away to more clearly show the details of the escapement device. Fig. 6 is a right end elevation, with the casing in section. Fig. 7 is a front elevation, with the casing in section to more fully show the brake mechanism. Fig. 8 is a detailed elevation of the count-

ing wheel showing its beveled ratchet-releasing nose. Fig. 9 is a plan of the sound-conveying arm and of a modified construction of stop-mechanism therefor.

5 Continuing by way of a more detailed analysis, it may be noted that this invention comprehends a trip or contact system which may operate either electrically or mechanically, but which preferably operates through
10 a contact element secured directly to each record, thereby avoiding the necessity of adjusting the mechanism whenever the records are changed.

15 Preferably, the lifting mechanism is normally disconnected from the source of power so as to avoid wear of constantly running wheels, and, to that end, the attachment is provided with a wheel which is normally out of action but which can be shifted to
20 engage the periphery of the turn-table and act to transmit power to the mechanism during the working periods.

Referring to the drawings, 1 indicates an element which is driven ultimately by the
25 conventional phonograph motor and in this embodiment it is convenient to utilize the turn-table itself as the source of motion and throw a frictional clutch to connect and disconnect the stylus-lifting mechanism therewith. A great advantage of this lies in the
30 facility with which this instrument can be attached by any ordinary user to any conventional phonograph. Such phonograph will also conveniently embody a suitable tone-arm 4 adapted to swing over the record
35 5 and carrying a sound-box 3 having the usual stylus 2; the whole being so arranged that the stylus can remain in the groove or be uplifted therefrom, this being here accomplished by having the tone-arm 4^a adapted
40 to swing about a pivot 4^b providing a horizontal axis as well as the ordinary vertical axis 4^c. This invention embodies means which will lift the tone-arm 4^a about its
45 horizontal axis in combination with means for swinging it also about its vertical axis 4^c back to the initial or starting point.

This invention contemplates a general mechanism adapted to enter into combination
50 with the above-named conventional elements to function as above stated, and specifically it embraces all or many coördinated subcombinations including (A) a sound-box lifter, which at appropriate intervals lifts and
55 lowers the stylus; (B) a tone-arm shifter which carries the stylus from the end to the beginning of the record; (C) a motion transmission which furnishes the necessary gears and shifts resulting in an actuation of the
60 lifter and shifter; (D) a power-connector which is in the nature of a clutch-mechanism and which at appropriate intervals connects the transmission with the primary source of power, which may preferably be the turn-
65 table itself but which may be any motor-

driven element; (E) a trip-system which is effective automatically to throw the power-connector into action at the appropriate station in the record; (F) a control-lever
70 which automatically effects a disconnection of the power-connector and normalizes the relation of the trip to the mechanism; (G) an adjuster which predetermines the number of times the mechanism operates to replay the record; and (H) a brake which is conveniently caused to operate to conclude the
75 performance.

These will be described in order.

The sound-box lifter, as shown by Fig. 1, consists of a davit 11 which is formed of
80 tubing bent L-shaped and having its lower end journaled in a bearing 9 formed by a boss projecting from the base-plate 15. This base-plate is mounted adjacent the base of the tone-arm 4 so that the horizontal upper
85 end of the davit may extend toward the tone-arm and terminate over the same in a relation which will presently be more fully explained. A tension element such as the
90 cord 12 (containing leading-in and out wires for the electric current) is anchored to the extremity of the davit 11 and also to an appropriate part of the sound-box 3, such as
95 the upper side thereof, and the extremity of the davit 11 is sufficiently higher than the axis 4^b so that a pull on the cord 12 will lift the arm 4^a about its horizontal axis, thus elevating the stylus. This davit has an arm
100 16 whereby it may be oscillated by the motion transmitting mechanism.

The tone-arm shifter, is for the purpose of causing the tone-arm to swing back to its starting position and, to avoid scratching the record by the stylus, this movement
105 should not begin until the stylus has been raised clear of the record. This invention contemplates a means that will come effectively into action only after the stylus has been raised and in this particular embodiment great simplicity has been attained by
110 intimately incorporating this means with the stylus lifter, and this has been done by a peculiar relation between the axes 11^b and 4^c of the davit and tone-arm, respectively, and the arc of swing of the point 11^a.
115 That is to say, in its normal or stylus-lowering position, the davit 11 is in such a position that the straight line from the point 11^a to the point 12^a is in substantially "dead center" relation with the axis 4^c, but when
120 the davit 11 swings into position shown by Fig. 1, this straight line becomes in off-set relation with the axis 4^c with the result that a pull on the cord 12 not only tends to lift the stylus but also imposes a turning move-
125 ment on the tone-arm and urges it gently yet sufficiently toward its initial position.

The motion-transmission is the mechanism or train of elements that results in the actuating of the stylus replacing means by power
130

derived from some motor-driven part, such as the turn-table 1; and which preferably embodies reduction gears so that the ultimate motion will be slow and deliberate and the stylus will be handled gently and without jerks and save the record from scratches. In this embodiment, this transmission is in part stationary and in part is bodily shiftable for power-connecting purposes. The stationary part comprises a shaft 19 pivoted at its lower end in the base of the main frame or casting 15 and at its upper end to the cover-plate 20 which is also fixed to said frame by means of the posts 21 and 22. The upper end of this shaft 19 is provided with an eccentric pin 19^a which is connected with the end of the arm 16 by means of the link 17 whereby the davit 11 may be rocked slowly. This shaft 19 derives motion from the clutch element or wheel 29 through a train of reduction gears 24, 25, 26, and 27, the shafts of which are all pivoted to the side plates 23 of a rocking-frame. Both gear-sets 24—25 and 26—27 have a pronounced reduction effect with the consequence that the crank-pin 19^a is but very slowly turned, although the friction wheel 29 may rotate several times during each revolution of the turn-table.

The power-connector is an arrangement in the nature of a clutch and it enables the turn-table to operate during the normal playing of a record without any concomitant operation of the return mechanism. Preferably this means is located so as to disconnect as many parts as possible from the source of motion, to avoid needless wear or noise, and preferably the wheel 29 is therefore entirely withdrawn from the turn-table. This is conveniently done by pivoting the plates 23 of the sub-frame to the shaft 19 so that the shaft 28 of the friction wheel will be carried by the remote free-swinging portion of the sub-frame.

The position of this sub-frame is in turn determined by the following arrangement:—

The lever control for the swinging power-connector functions first to unlatch and resiliently swing the sub-frame to bring the friction-wheel 29 into engagement with the periphery of the turn-table and to maintain this engagement until the tone-arm has been shifted to its initial point, and in the meanwhile to effect a re-latching of the control-lever, and then through the same lever to withdraw the friction-wheel and permit the record to be played without interference. This triple action is very easily effected by the multiple-fulcrum lever-system comprising a lever 31 which is permanently pivoted at 30 to the plate 23 of the swinging sub-frame and which, in the position of the parts shown by Fig. 2 can (when unlatched) be turned about the stationary fulcrum point 18^a formed by a flat edge of the cam plate 18.

That is to say, the end of the lever 31 has entered a right-angle notch 32 in the cam-plate 18 so that it may rest against the edge 18^a thereof which constitutes a stationary fulcrum enabling the lever 31 at the point 30 to pry the plate 23 around the axis 19. Normally the lever is held against this movement by means of a pin 33 which engages with a notch 34 of a latch 35 pivoted at 36 to a frame-element and spring-pressed into position by the pull of the spring 38 on the end of the arm 37. The rotation of the cam 18 begins the moment the wheel 29 starts to actuate the davit 11 and the rotation is anti-clockwise and immediately brings the raised portion 18^c against the edge of the lever 31 so as to force its end away from the shaft 19 and swing the lever about the pivot 30 (the sub-frame remaining still) until the latch pin 33 has passed the notch 34 in the latch 35. This condition remains unchanged while the periphery of the cam-plate 18 rides against the edge of the lever 31 and until the point 18^c passes the end of the lever 31, whereupon the fulcrum provided by the cam 18 will have disappeared and immediately its place is taken by the pin 33 so that the spring 38 now tends to turn the lever 31 around the pin 33 as a fulcrum and this tends to throw the pivotal connection 30 in the opposite direction and, of course, withdraws the sub-frame and the friction wheel 29 so that all motion ceases in the entire attachment. The sub-frame continues to withdraw until the end of the lever abuts the part 18^a again, when the position of Fig. 2 is attained. This action has resulted in an elevation of the stylus, a swinging of the tone-arm, and a replacement of the stylus. Now, the stylus is in a position to replay the record and will continue to do so until a trip system comes into effect to release the latch 35 and cause the attachment to refunction in restoring the stylus to its initial position.

The trip system contemplates a means for causing the latch 35 to swing aside and release the pin 33 and this movement of the latch 35 may be effected either mechanically or electrically, the latter possessing the advantage of making it unnecessary to reset the trip adjustment when a new record disk is played in the machine. In this embodiment, a thin brass washer 14 is affixed to each particular record at a proper point so that it will close the circuit between the two spring fingers 13 when the stylus 3 reaches the end of the sound groove. The current passes through the conductor which leads upwardly as indicated by 12^a and is secured at 11^a to the hollow arm of the davit 11 and it passes down this davit through the hollow post 9 (Fig. 6) and thence through the opening 9^a and the end 12^c is fast to the one binding post *x* of the electro-magnets 39. The other binding post *z* may, by means of the small

wire *w*, be grounded to the arm 15 to complete the circuit. Thus, whenever the contact 14 functions, the electro-magnets will retract the latch 35 and the resetting of the stylus will take place.

The adjuster operates to determine the number of times the record is to be replayed; this number ranging from one to eight, or more, according to the construction. So far as has been explained, the above described apparatus would perform repeatedly an indefinite number of times, but this invention proposes a very simple arrangement for limiting the operation of the instrument. That is to say, a brake is caused automatically to stop the turn-table; preferably just after the stylus has been uplifted and the tone arm returned. This brake consists of a rod 40 journaled to slide in the posts 41 and 22 and normally urged in the direction of the turn-table by the spring 46 so that, if otherwise free, it will advance to project its end 42 (carrying a friction surface) through the opening 21^a in a post 21 and directly against the periphery of the turn-table, thereby stopping it. This movement is restrained, however, by means of a controller 43 having a number of teeth 44 which can cooperate with the periphery 45^a of a spiral track 45. This frame 43 can be adjusted, with the brake-rod 40, by grasping the nob 43^a and it is provided with a pointer 50 cooperating with indication marks 51. Now, during each revolution of the track 45, the end 47 will receive and pass one tooth, and if there be three teeth to pass then the instrument will operate three times before the brake is released by the sharp nose 47 which rides under and lifts up the smooth portion 48. The releasing point depends upon the location of the end 47 of the track and this will preferably be such that the davit will be moved to its uplift position.

For the purpose of limiting the swing of the sound conveying arm, I provide a stop member 52 journaled on an upright stud 53, which also serves as a securing member for the shelf 20. This stop member has an L-shaped head 54, having a short and long arm, and it may be turned on the upright to bring either into the path of movement of the sound conveying arm, alternately serving for relatively different standard sizes of records. While this stop is only adapted for use with records of two different diameters it may be interchanged with a stop member having stop arms of different lengths to accommodate records of any size.

In Fig. 9, I have shown a modified form of stop provided with a spring retaining clip engaging with a series of notches in the supporting upright. A rotation of the stop arm in a clockwise direction will engage the spring clip in either of the notches, while the shape of the clip and notches will pre-

vent retrograde movement and form rigid abutment.

Without further analysis, the foregoing will so fully reveal the gist of this invention that others can by applying current knowledge readily adapt it for various applications without omitting certain features that, from the standpoint of the prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention, and therefore such adaptations should and are intended to be comprehended within the meaning and range of equivalency of the following claims.

Having thus revealed this invention, I claim as new and desire to secure the following combinations of steps and elements, or equivalents thereof, by Letters Patent of the United States:—

1. A replaying phonograph combining a stylus-supporting sound-box; an elevator therefor; a laterally-shiftable tone-arm carrying said sound-box; a slow-motion transmission involving reduction-gearing adapted to derive motion from the motor of the phonograph; and positive means actuated by said transmission for slowly operating said elevator to raise and then lower said sound box, and to cause said elevator meanwhile to restore said tone-arm to its initial position.

2. An instrumentality affixable to render a phonograph automatically replayable and combining a frame attachable near the turn-table; a wheel adapted to be driven by the turn-table; means carried by said frame for raising and lowering the stylus of the phonograph; latch-mechanism adapted to be tripped at a predetermined station of the stylus to utilize said wheel in transmitting power to said means to enable it slowly to raise and lower said stylus; and means for automatically normalizing said latch mechanism and concluding the operative relation between said turn-table, said wheel and said means.

3. A tone-arm returner combining a horizontally extending tone-arm mounted to swing about a vertical axis; a pull-member attached thereto at a point remote from said axis; an actuating element having a connection with said pull-member, and normally positioned to aline said axis, point and connection; and means for automatically shifting the position of said actuating-element to off-set said connection and create a turning-moment for said tone-arm.

4. A combined stylus lifter and tone-arm shifter comprising a tone-arm swingable about a vertical axis; a stylus-support pivoted about a horizontal axis to the free end of the tone-arm; an elongated element attached to said stylus support; an actuating member having a connection with said elongated element and adapted to move it length-

wise and being normally positioned to aline said vertical axis with the two points of attachment of said elongated element to permit it initially to uplift said stylus-support without swinging said tone-arm; and means for offsetting said connection with relation to said vertical axis to create a turning moment for swinging said tone-arm.

5. A stylus-lifter combining a sound-box movable to raise its stylus; an insulated conductor attached to said sound-box to raise its stylus when pulled; a contact electrically connected with said conductor and adapted to close a circuit with a contact mounted on a record; mechanism for pulling said conductor; and magnetic means adapted to be energized through said conductor to render said mechanism operative.

6. A re-playing phonograph combining a stylus-supporting sound-box; an elevator therefor; a laterally shiftable tone-arm carrying said sound-box; a slow motion transmission involving reduction-gearing; latch-operated means for establishing a propelling relation between said transmission and a motor driven part of the phonograph and positive means actuated by said transmission, for slowly operating said elevator to raise and then lower said sound-box, and for meanwhile restoring said tone-arm to its initial position.

7. An instrumentality affixable to render a phonograph automatically replayable and combining a frame attachable near the turn-table; a wheel shiftable into engagement with the turn-table; means actuated by said wheel for raising and lowering the stylus of the phonograph; latch-mechanism adapted to be tripped at a predetermined station of the stylus to permit shifting of said wheel to render said means operative slowly to raise and lower said stylus; means for automatically normalizing said latch mechanism and restoring said wheel to its inoperative position.

8. A tone-arm returner combining a horizontally extending tone-arm mounted to swing about a vertical axis; a pull-member attached thereto at a point remote from said axis; an actuating element pivoted at one side of said vertical axis and provided with an extension toward said tone-arm having a connection with said pull-member normally so positioned as to aline said axis, point and connection; and means for automatically turning said actuating-element to off-set said connection and create a turning-moment for said tone-arm.

9. A combined stylus-lifter and tone-arm shifter comprising a tone-arm swingable about a vertical axis; a stylus support pivoted about a horizontal axis to the free end of the tone-arm; an elongated element attached to said stylus-support; an actuating member providing an extension having a

connection with said elongated element to move it lengthwise; the point of connection when said tone-arm is at the end of its swing being in a position to aline said vertical axis with the two points of attachment of said elongated-element to permit it initially to uplift said stylus-support without swinging said tone-arm; and means for shifting said extension to off-set said connection with relation to said vertical axis to create a turning-moment for swinging said tone-arm.

10. A replaying phonograph combining a stylus-supporting sound-box; an elevator therefor; a laterally-shiftable tone-arm carrying said sound-box; a slow-motion transmission involving reduction-gearing adapted to derive motion from the turn-table of the phonograph; a device adapted to be tripped to cause an element of said transmission to be moved into power-receiving position, and positive means actuated by said transmission for slowly operating said elevator to raise and then lower said sound-box, and for meanwhile restoring said tone-arm to its initial position.

11. An instrumentality affixable to render a phonograph automatically replayable and combining a frame attachable near the turn-table; a wheel shiftable to be driven by the turn-table; wheel-actuated means for raising and lowering the stylus of the phonograph; latch-mechanism adapted to be tripped at a predetermined station of the stylus to permit said wheel to shift into engagement with said turn-table so as to be driven thereby and thereupon cause said means slowly to raise and lower said stylus; and means for automatically shifting said wheel back into its inoperative position.

12. A tone-arm returner combining a horizontally extending tone-arm mounted to swing about a vertical axis; a pull member attached thereto at a point remote from said axis; an actuating-element pivoted near said axis at one side thereof and having an extension terminating over said tone-arm, and at its end, having a connection with said pull-member normally alining said axis, point and connection; and means for slowly and automatically oscillating said actuating element to periodically off-set said connection and create a turning moment causing said arm to return to its initial position.

13. A combined stylus-lifter and tone-arm shifter comprising a tone-arm swingable about a vertical axis; a stylus support pivoted about a horizontal axis to the free end of the tone-arm; an elongated element attached to said stylus-support; a davit pivoted at one side of said vertical pivot and having an extension over said tone-arm having at its extremity a connection with said elongated element and adapted to move it

lengthwise, said extremity being normally positioned to aline the axis of the tone-arm when at the end of its swing with the two points of attachment of said elongated-element to permit it initially to uplift said stylus-support without swinging said tone-arm; and means for shifting the position of said extremity to off-set said connection with relation to said vertical axis to create a turning-moment for swinging said tone-arm.

14. A stylus-lifter combining a sound-box movable to raise its stylus; an insulated conductor attached to said sound-box to raise its stylus when pulled; a contact electrically connected with said conductor and adapted to close a circuit with a contact mounted on a record; mechanism for pulling said conductor; and magnetic means adapted to be energized through said conductor to render said mechanism operative by mechanically connecting it to be propelled by the turn-table.

15. A sound - reproducing instrument comprising a rotating turn-table, a horizontally-swinging sound-conveying arm, a vertically-swinging-sound-box carried thereby; an oscillatory arm operatively connected to the sound-box, and in one of its swinging motions adapted to elevate the sound-box and to shift said sound-box and its supporting sound-conveying arm; a drive-unit movable to connect with and receive motion from the turn-table for operating the oscillatory-arm, and an electric control for the drive-unit.

16. A sound-reproducing instrument comprising a rotating turn-table; a horizontally-swinging sound-conveying arm; a vertically-swinging sound-box carried thereby; an oscillatory arm operatively connected to the sound-box adapted to elevate and shift said sound-box; a drive-unit for the oscillatory-arm operated by the turn-table; means for latching said unit in a non-functioning position; and an electric device controlled by the translation of the sound-box for tripping said means to operate the drive unit.

17. A device of the class described comprising a propelled record-supporting member; an arm provided with a stylus-carrying sound-box swingingly supported transversely movable under the influence of the stylus and record-groove engagement; transmission devices fulcrumed to swing into engagement with said record supporting member to receive motion therefrom; an oscillating member operated by said transmission devices and moving in an arc eccentric to the axis of said arm, and a connector-element uniting said arm and oscillating member for positioning said arm and its stylus at a starting station after a predetermined traverse across a record.

18. A device of the class described comprising a propelled record-supporting member; an arm provided with a stylus-carrying sound-box swingingly supported transversely movable under the influence of the stylus and record-groove engagement; transmission devices fulcrumed to swing into engagement with said record supporting member to receive motion therefrom; an oscillating-member operated by said transmission-devices and in an arc eccentric to the axis of said arm; a connector-element uniting said arm and oscillating-member for positioning said arm and its stylus at a starting-station after a predetermined traverse across a record; and electrically controlled tripping devices for predeterminedly rendering said transmission devices operative.

19. A device of the class described comprising a propelled record-supporting member; a stylus-supporting member pivoted to swing across the face of a record upon said record-supporting member; and an inextensible cord having one end connecting with said stylus-supporting member and its other end anchored remotely therefrom to extend in a line off-set to the axis of said pivoted member, whereby a pulling strain upon said cord will move said member to a starting station.

20. In a device of the class described, a disk-record rotating member, an arm movable transversely of the record having a sound-box movable to and from the record surface; mechanism adapted to return the arm to initial position after a sound reproduction, including transmission devices movable into and out of engagement with said rotating member; an electrical control for said means determining the point in sound reproduction at which said mechanism becomes operative, and means determining the limit of the return movement of the arm.

21. A device of the character described comprising a rotating turn-table; a horizontally-swinging sound-conveying arm; a sound-box including a stylus-holder swiveling on said arm to move the stylus-holder toward and from the turn-table record-supporting surface; a swiveled member; means connecting the sound-box to a part of said member in off-set relation to the axis of said arm so as to raise the stylus-holder and also swing the arm to its starting location and then to restore the sound-box to its active position; transmission devices for turning said member; and controlling means for said transmission devices.

22. A device of the class described comprising a rotative record-supporting member; a sound-conveying arm moving across the face of said member; a stylus-carrying sound-box swiveled upon said arm; an in-

extensible pull-member having one end connecting with said sound-box and extending toward the axis of said arm, whereby a drawing motion of said member will swivel
 5 said sound-box and move said arm to a starting station, and means for operating said pull-member.

23. A device of the class described comprising a rotative record-supporting member; a sound-conveying arm supported to swing across the face of said record-supporting member and including a stylus-carrying sound-box; an operating means; a pull-member having one end connected to the
 15 free end of said arm and its opposite end attached to said operating means at one side of the axis of said arm; and a slow motion mechanism for operating said means, whereby a drawing-motion of said pull-member will impart a swinging motion to
 20 said arm to move the same to a starting station.

24. A device of the class described comprising a propelled record-supporting member; a stylus-supporting tone-arm fulcrumed to swing over the face of a record on said supporting member; a member extending approximately coincident with said arm with its forward end connecting with said
 25 arm, whereby a pulling strain upon said member will swing said arm to a starting point; and a slow motion means for periodically pulling said member with a slow deliberate motion.

25. A device of the class described comprising a swiveled tone-arm; an inextensible pull-member extended approximately radially with said arm having one end connected therewith and adapted to swing simultaneously with said arm; and a rocking member pivoted to the opposite end of said member for shifting the axis of said pull-member relatively to the axis of said arm, whereby said pull-member is adapted to
 40 swing said arm.

26. A device of the class described comprising a swiveled tone-arm; a sound-box swiveled upon said arm; a swiveled member arranged to swing coördinately with said
 50 arm; a connection enabling said member to swing said tone-arm; and means for varying the relations between the axis of said arm

and the operating end of said member, and reciprocate said member for swinging said box and arm upon their respective axes in one stroke and said sound-box independently in an alternate stroke. 55

27. A device of the class described comprising a swiveled tone-arm; a sound-box swiveled upon said arm to swing transversely to the swing of the arm; a member connecting with and extending to coördinately swing with said arm; means for varying the coördinate relation between the axis of said arm and the operating end of said member for swinging said sound-box and arm; and controlling devices for said means operative when said arm arrives at swing limits for alternating the operation of said arm, member and said box. 60 65 70

28. A device of the class described comprising a rotating record-supporting table; a swiveled tone-arm adapted to swing across said table; a sound-box swiveled upon said arm to swing to and from the table; a link member connecting with said sound-box and adapted to swing in a horizontal plane with said arm; devices connecting with said link member to reciprocate the same for swinging said sound-box and arm coördinately and independently to position said parts to a repeat position; and transmission devices predeterminately operative for functioning said first named devices. 75 80

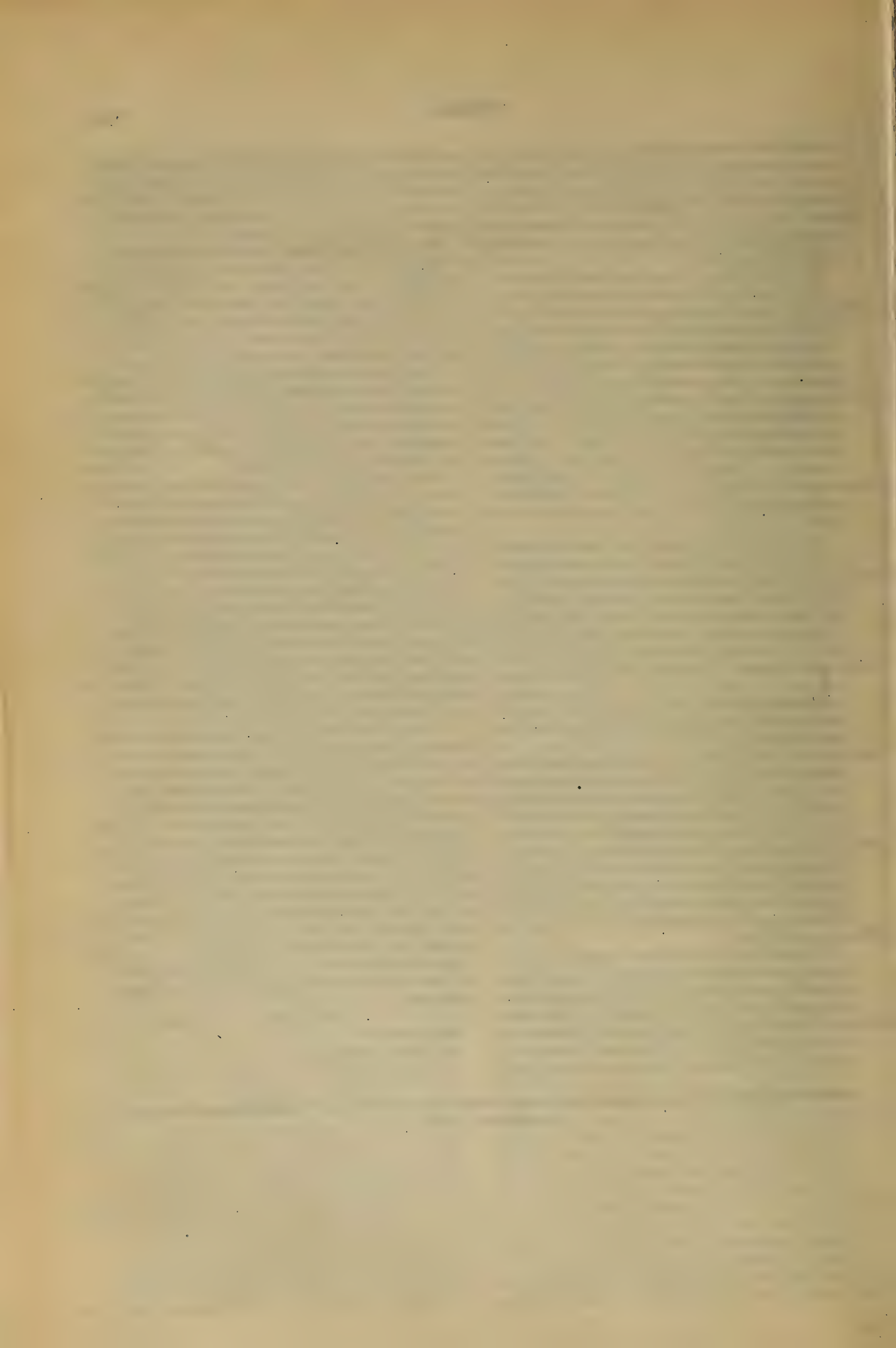
29. A device of the class described comprising a rotating record-supporting table; a swiveled tone-arm adapted to swing across said table; a sound-box swiveled upon said arm to swing toward and from said table; a member connecting with said sound-box adapted to swing in a horizontal plane with said arm; crank devices connecting with said member for reciprocating the same to raise and lower the sound-box and swing the same to a starting point; means for operating said crank devices; and tripping means for controlling said crank operating means. 85 90 95

In witness whereof, I hereunto subscribe my name, as attested by the two subscribing witnesses.

ROBERT G. BROWN.

Witnesses:

EMMA SPFNER,
 L. A. BECK.



SPRING MOTOR,
#1,221,072-----H. B. McNulty
Patented-April 3rd, 1917.
Filed-January 26th, 1916.

H. B. McNULTY.

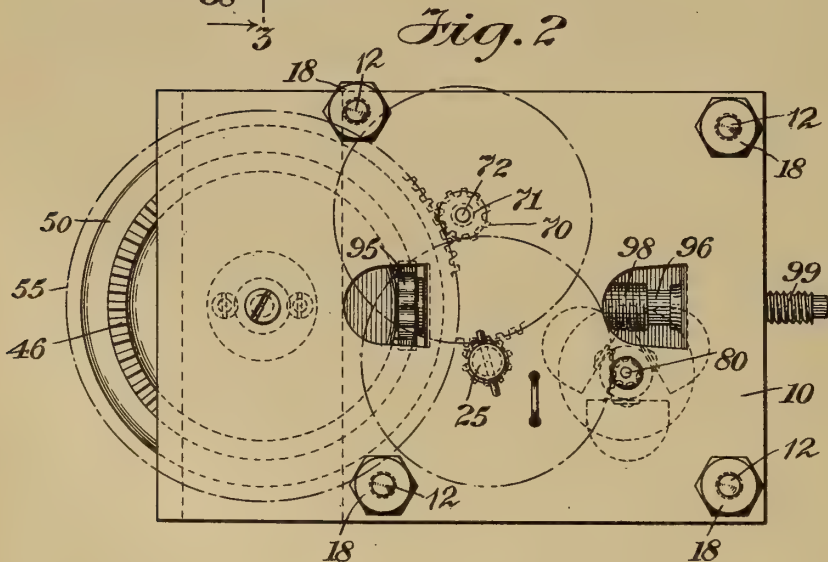
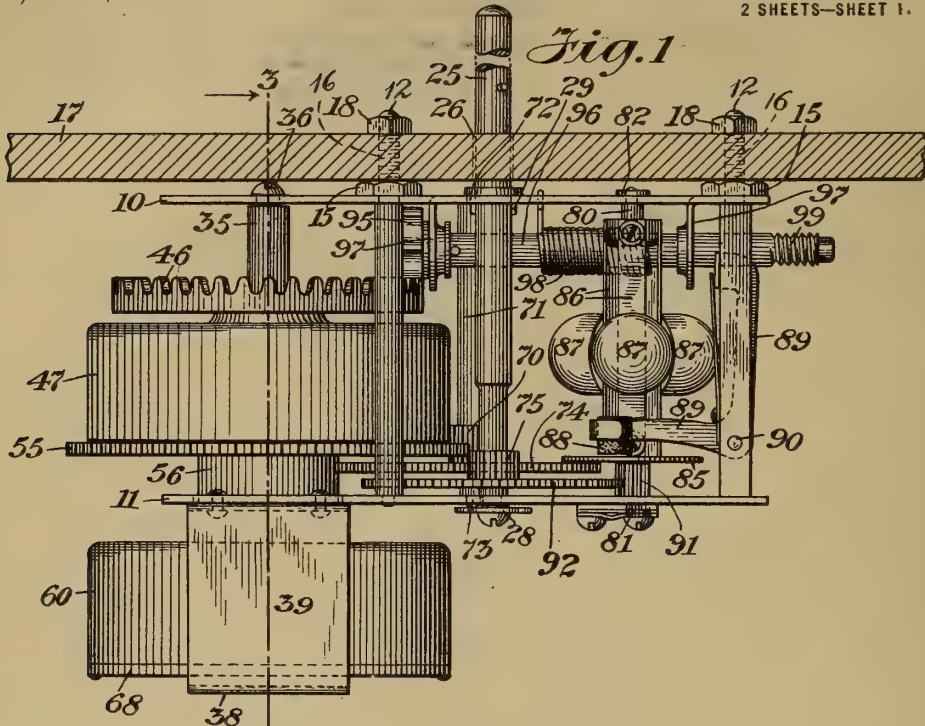
SPRING MOTOR.

APPLICATION FILED JAN. 28, 1916.

1,221,072.

Patented Apr. 3, 1917.

2 SHEETS—SHEET 1.



WITNESSES

Chas. Clagett
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INVENTOR

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HIS ATTORNEY

H. B. McNULTY.

SPRING MOTOR.

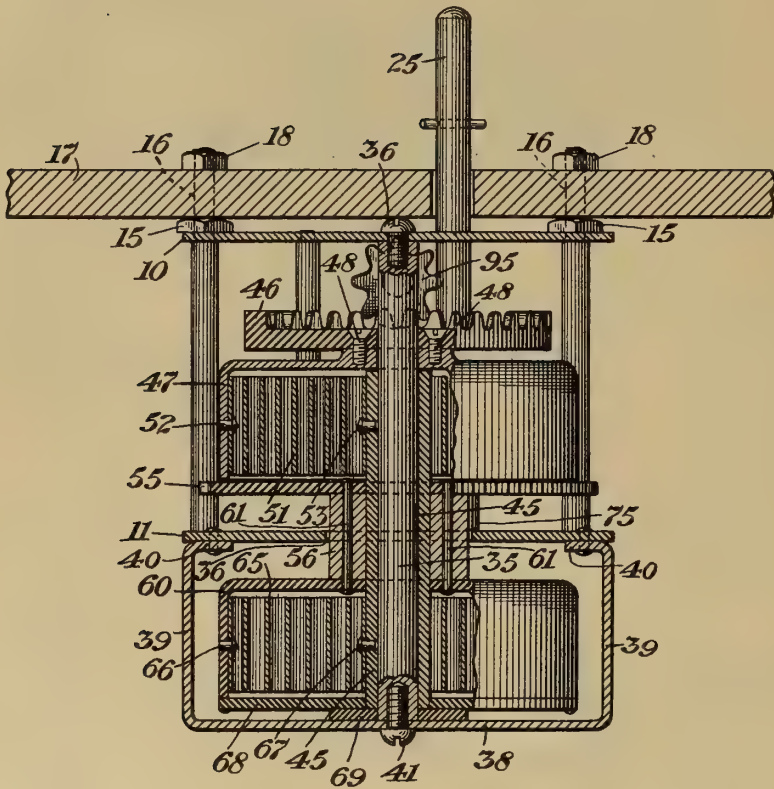
APPLICATION FILED JAN. 28, 1916.

1,221,072.

Patented Apr. 3, 1917.

2 SHEETS—SHEET 2.

Fig. 3



WITNESSES

Chas. J. Clagett
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UNITED STATES PATENT OFFICE.

HARRY B. McNULTY, OF NEW YORK, N. Y., ASSIGNOR TO WONDER TALKING MACHINE COMPANY INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

SPRING-MOTOR.

1,221,072.

Specification of Letters Patent.

Patented Apr. 3, 1917.

Application filed January 28, 1916. Serial No. 74,785.

To all whom it may concern:

Be it known that I, HARRY B. McNULTY, a citizen of the United States, and a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Spring-Motors, of which the following is a specification.

Some of the objects of this invention, are to provide a spring motor of simple compact and durable construction having two actuating springs; to provide an improved spring motor particularly adapted for use in rotating the record support of a talking machine; and to provide other improvements as will appear hereinafter.

In the accompanying drawings, Figure 1 is a side elevation of a spring motor constructed in accordance with this invention; Fig. 2 a top plan view of the same; and Fig. 3 a fragmentary transverse section of the same taken on line 3—3 of Fig. 1.

Referring to the drawings, one embodiment of this invention comprises a spring motor including two substantially parallel and horizontal supporting plates 10 and 11, of mild steel or wrought iron which are held in fixed relationship by a plurality of substantially vertical spacing rods or bolts 12, the lower ends of which are reduced in diameter and extend through and are riveted securely to the lower supporting plate 11, and the upper ends of which are reduced in diameter and threaded and project loosely through suitable apertures provided therefor in the upper plate 10, and are securely clamped to the upper plate by means of nuts 15 threaded upon the upper ends of the rods. The threaded portions of the rods 12 extend above the nuts 15 and are arranged to project loosely through apertures 16 provided therefor in a fixed horizontal partition or support 17 to which the rods are rigidly clamped by nuts 18 threaded over the rods above the partition 17.

For rotating a sound record support or any other object, a vertical spindle 25 projects loosely through an aperture 26 provided in the partition 17, and projects snugly but rotatably through an aperture provided therefor in the upper plate 10. The lower end of this spindle 25 projects snugly but rotatably through the lower plate 11 and is rotatably held against downward movement by any suitable bearing 28 secured to the under side of the lower plate 11. The

spindle 25 is held against upward movement by opposed lugs 29 struck up from the spindle and slidably engaging against the under surface of the upper plate 10.

For rotating the spindle 25 a vertical cylindrical shaft 35 abuts at its upper end against the under surface of the upper plate 10 and is rigidly secured thereto by a screw 36 extending loosely through the upper plate and threaded into the upper end of the shaft. This shaft projects downwardly through a recess 36 provided in one edge of the lower plate 11 and the lower end of the shaft 35 is spaced below the lower plate and abuts against the central portion of the upper surface of a rigid yoke or stirrup 38 made of mild steel or wrought iron and the opposite ends of which extend upwardly as at 39 and are then bent inwardly forming flanges 40 which are securely riveted to the under surface of the lower plate 11 thus holding the yoke 38 fixedly in position. A screw 41 extends snugly through the yoke 38 and is threaded into the lower end of the shaft 35 thus holding the lower end of the shaft in a fixed position.

Spaced above the sleeve 45 and loosely surrounding the stationary shaft 35 is a winding gear 46, beneath which and loosely surrounding the sleeve 45 is a downwardly facing cylindrical spring barrel 47 which rests loosely upon the upper end of the sleeve 45 and which supports the winding gear 46 and is rigidly secured thereto by rivets 48 or other means. This spring barrel contains a spiral spring 51 one end of which is detachably secured to the spring barrel as at 52, and the other end of which is detachably secured to the sleeve as at 53. The lower end of the spring barrel 50 rests loosely upon and is covered by a main driving gear 55 which loosely surrounds the sleeve 45.

Beneath the main driving gear 55 and loosely surrounding the sleeve 45 is a spacing collar 56, the upper end of which abuts against the lower surface of the main driving gear, and the lower end of which abuts against the upper surface of a downwardly facing cylindrical spring barrel 60 which loosely surrounds the sleeve 45 between the lower plate 11 and the yoke 38. Rivets or bolts 61 extend through the main driving gear 55, the collar 56 and the lower spring barrel 60 and connect these parts rigidly

together. The lower spring barrel 60 contains a spiral spring 65 one end of which is detachably secured to the spring barrel as at 66 and the other end of which is detachably secured to the sleeve 45 as at 67. The lower end of the lower spring barrel 60 is closed by a cover 68 rigidly secured thereto and loosely surrounding the sleeve 45. The lower surface of the cover 68 and the lower end of the sleeve 45 rests rotatably upon and are supported by a washer 69 which loosely surrounds the shaft 35 and which is preferably made of brass or fiber or some other antifriction material.

For transmitting motion from the main driving gear 55 to the spindle 25, the main driving gear 55 engages a pinion 70 fixedly secured upon a vertical countershaft 71 which is rotatably supported at its ends in suitable bearings 72 and 73 provided therefor in the upper and lower plates 10 and 11 respectively, whereby it is held against longitudinal movement and is arranged to rotate about a fixed vertical axis coincident with its longitudinal axis. An intermediate gear 74 surrounds and is rigidly secured to this countershaft and engages a pinion 75 surrounding and rigidly secured to the spindle 25.

For controlling the speed of the motor, a vertical governor spindle 80 projects at its lower end snugly but rotatably through the lower plate 11, and is held against downward movement by a bearing 81 secured to the under side of the lower plate. The upper end of the governor spindle projects snugly but rotatably through a bearing 82 extending through and carried by the upper plate 10. Surrounding and slidable longitudinally of the governor spindle 80 is a friction disk 85 to which is connected one end of each of a plurality of springs 86 the other ends of which are fixedly secured to the governor spindle 80, and secured to the central portion of each spring is a "fly ball" 87. Arranged above the friction disk 85 to cooperate therewith in a well known manner is a friction shoe or pad 88 carried by one end of a bell crank lever 89 which is pivotally connected as at 90 to one of the rods or posts 12. A pinion 91 fixed upon the governor spindle 80 is engaged and rotated by a gear 92 fixed upon the turntable spindle 25. The lever 89 is arranged to be adjusted about its pivot in any well known or suitable manner to vary the speed of the motor, and for any given adjustment of the lever 89 the motor is controlled to rotate at a corresponding substantially fixed rate.

For winding the springs 51 and 65 in the spring barrels, a pinion 95 engages the winding gear 46 and is rigidly secured to one end of a winding shaft 96 which is rotatably supported and held against longitudinal movement in spaced bearings 97,

which depend from and are preferably integral with the top plate 10. A spiral spring 98 snugly surrounds the winding shaft and is secured at one end to the top plate 10, the arrangement being such that the spring 98 does not oppose the rotation of the winding shaft in a clockwise direction to wind the springs in the spring barrels, but prevents the rotation of the winding shaft in an opposite direction. The outer end of the winding shaft is threaded as at 99 to receive a winding crank.

In the operation of this improved motor, when the winding shaft is rotated in a clockwise direction, the pinion 95 will rotate the winding gear 46 and upper spring barrel 47 in a clockwise direction, thus winding the upper spring 51 and at the same time rotating the sleeve 45 in a clockwise direction to wind the lower spring 65. The winding of the springs 51 and 65 may be accomplished either while the driving gear 55 is in operation rotating at a rate limited by the governor, or while it is held against rotation, as for instance, in a well known manner, by a brake (not shown). The springs 51 and 65 having been thus wound, act to rotate the driving gear 55 in a clockwise direction, as viewed from above, when released by the brake, and the motion is transmitted from the driving gear 55 to rotate the spindle 25 in a clockwise direction and at a predetermined rate controlled by the governor as hereinbefore described.

Although only a single form has been shown in which this invention may be embodied, it is to be understood that the invention is not limited to any specific construction, but might be embodied in various forms without departing from the spirit of the invention or the scope of the appended claims.

Having thus fully described this invention, I claim:

1. In a spring motor, the combination with two substantially parallel plates, of a rotary spindle carried thereby, and means for rotating said spindle including a shaft carried by and substantially perpendicular to said plates and extending upon opposite sides of the plane of one of said plates, a pair of spring barrels surrounding said shaft upon opposite sides of said plate respectively, a driving spring in each of said barrels and a winding gear and a main driving gear surrounding said shaft between said plates.

2. In a spring motor, the combination with two substantially parallel plates, of a rotary spindle carried thereby, and means for rotating said spindle including a stationary shaft carried by and substantially perpendicular to said plates and extending upon opposite sides of the plane of one of said plates, a pair of spring barrels sur-

rounding said shaft upon opposite sides of said plate respectively, a driving spring in each of said barrels, and a winding gear and a main driving gear surrounding said shaft between said plates.

3. In a spring motor, the combination with two substantially parallel plates, of a rotary spindle carried by said plates, and means for rotating said spindle including a stationary shaft substantially perpendicular to said plates and secured to and projecting from one of said plates toward and through the plane of the other of said plates, a sleeve loosely surrounding said shaft, a winding gear loosely surrounding said shaft between said plates, a spring barrel secured to said winding gear and loosely surrounding said sleeve between said plates, a spring connecting said spring barrel and said sleeve, a spring barrel loosely surrounding said sleeve outside of said plate, a spring connecting said second mentioned spring barrel and said sleeve, a driving gear arranged between said spring barrels and secured to said second mentioned spring barrel, transmission means between said driving gear and said spindle, and located between said plates, and means engaging the outer end of said shaft for holding the same in position.

4. In a spring motor, the combination with a substantially vertical fixed shaft, of a sleeve loosely surrounding said shaft, a downwardly opening spring barrel loosely surrounding said shaft, a winding gear superimposed upon and secured to said barrel and loosely surrounding said shaft, a spring in said barrel and operatively connecting said barrel to said sleeve, a driving gear beneath and rotatable with respect to said barrel and loosely surrounding said sleeve, a spring barrel below and secured to said driving gear and loosely surrounding

said sleeve, a spring in said last mentioned barrel operatively connecting the same to said sleeve, and means arranged beneath said last mentioned barrel to support the same and said sleeve.

5. In a spring motor, the combination with a substantially vertical fixed shaft, of a sleeve loosely surrounding said shaft, a downwardly opening spring barrel loosely surrounding said shaft at a point above said sleeve, a winding gear superimposed upon and secured to said barrel, and loosely surrounding said shaft, a spring in said barrel and operatively connecting said barrel to said sleeve, a driving gear beneath and rotatable with respect to said barrel and loosely surrounding said sleeve, a spring barrel below and secured to said driving gear and loosely surrounding said sleeve, a spring in said last mentioned barrel operatively connecting the same to said sleeve, and antifriction means surrounding said shaft and engaging the lower ends of said sleeve and said last mentioned barrel to support the same.

6. In a spring motor, the combination with a shaft, of a pair of spring barrels coaxial with said shaft, a driving gear between and secured to one of said spring barrels, a winding gear secured to the other of said barrels, a sleeve rotatable with respect to said barrels and surrounding said shaft and extending through said driving gear and into said barrels, and a spring connecting each of said barrels to said sleeve.

Signed at New York in the county of New York and State of New York this fifth day of January A. D. 1916.

HARRY B. McNULTY.

Witnesses:

GEORGE W. CASE, Junr.,
KARL TAUSIG.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

DRIVING AND SPEED REGULATING
MECHANISM FOR PHONOGRAPHS,

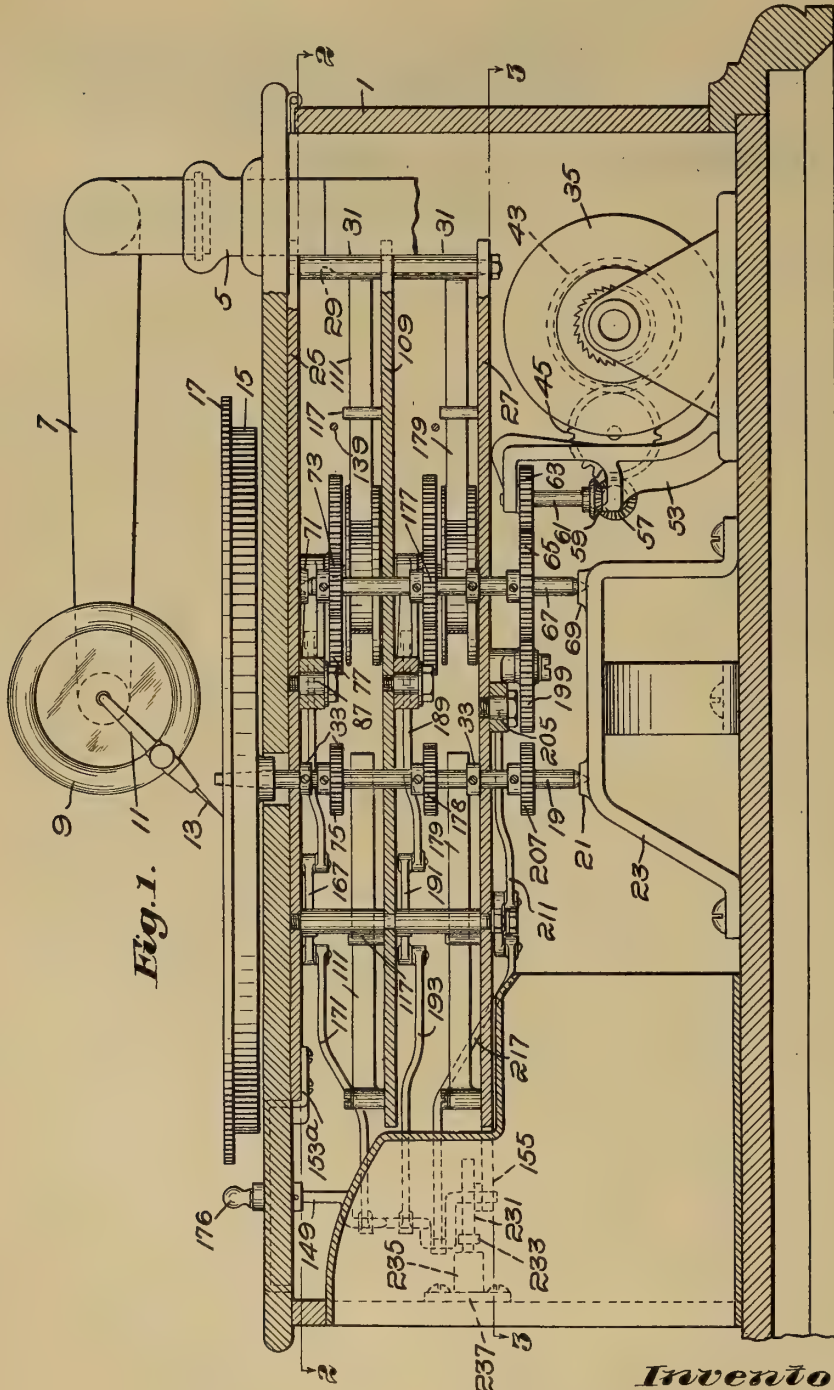
#1,221,074-----S. R. MacLane,
Patented-Apr. 3rd, 1917.
Filed-September 2nd, 1915.

S. R. MacLANE.
 DRIVING AND SPEED REGULATING MECHANISM FOR PHONOGRAPHS.
 APPLICATION FILED SEPT. 2, 1915.

1,221,074.

Patented Apr. 3, 1917.

5 SHEETS—SHEET 1.



Inventor:
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 by *Wm. B. Smith, James W. MacLane*
 Attys.

S. R. MacLANE.

DRIVING AND SPEED REGULATING MECHANISM FOR PHONOGRAPHS.

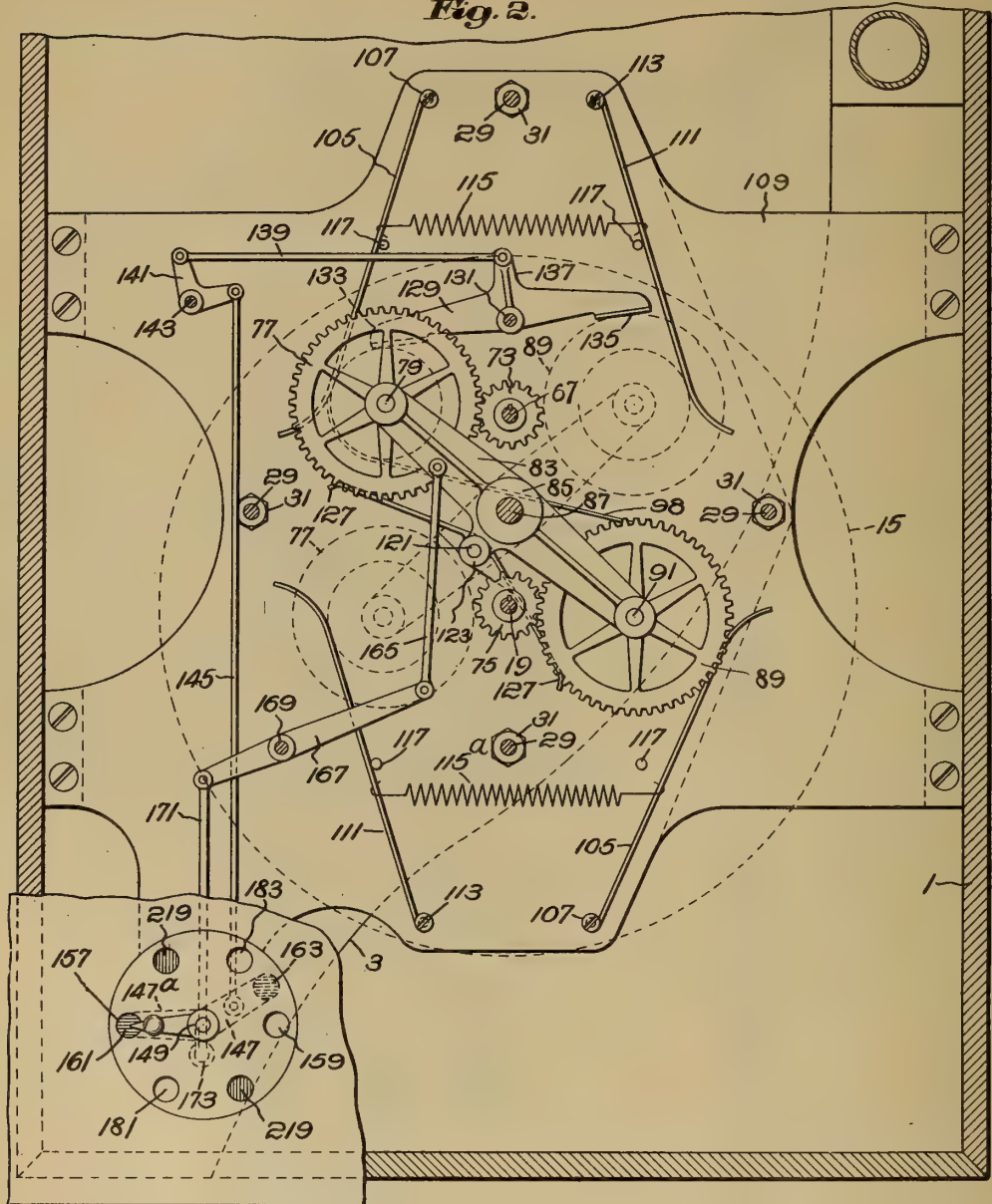
APPLICATION FILED SEPT. 2, 1915.

Patented Apr. 3, 1917.

5 SHEETS—SHEET 2.

1,221,074.

Fig. 2.



Inventor:
Stanley R. MacLane,
by *Emory R. Smith, James H. Vane*
Attys

S. R. MacLANE.

DRIVING AND SPEED REGULATING MECHANISM FOR PHONOGRAPHS.

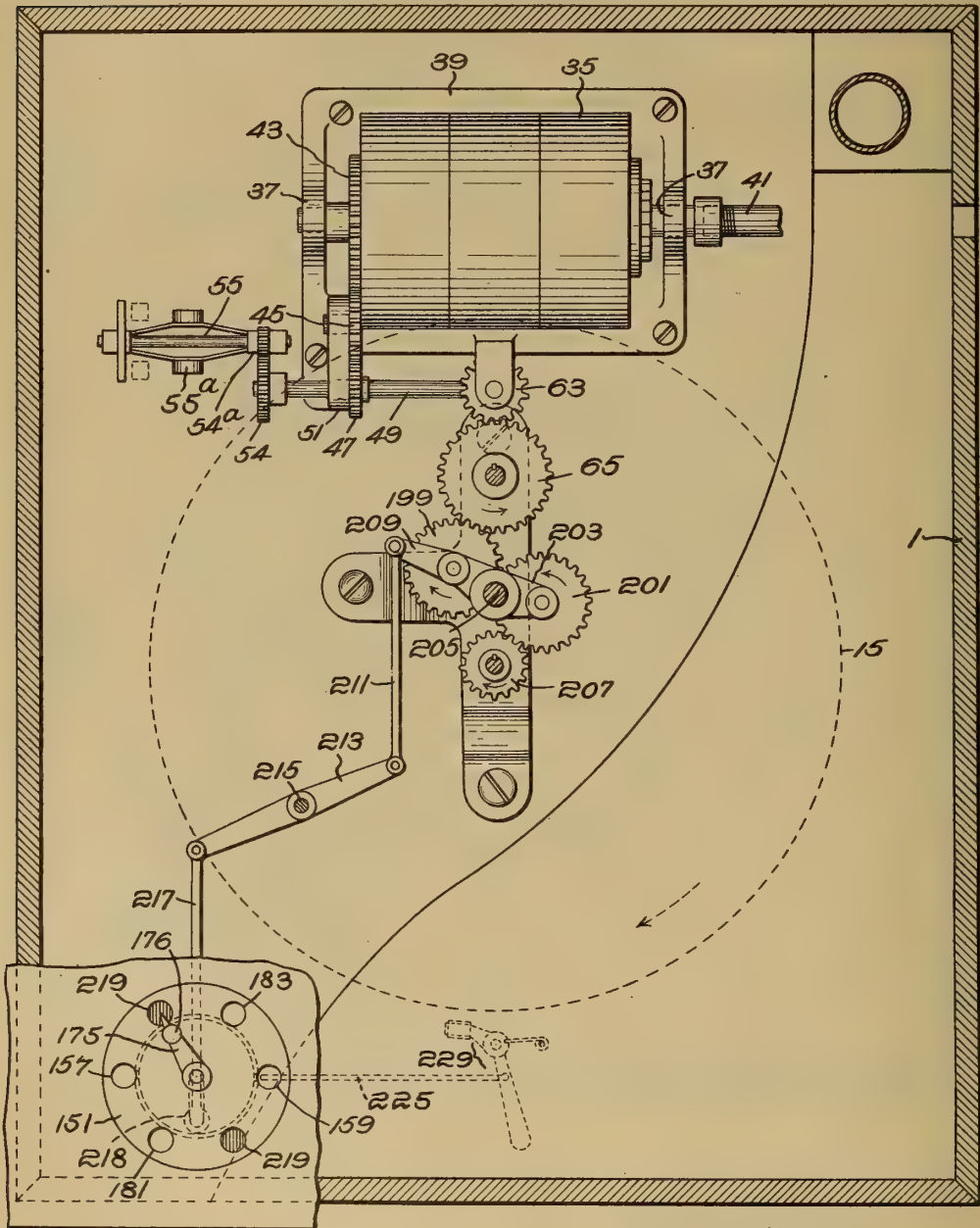
APPLICATION FILED SEPT. 2, 1915.

1,221,074.

Patented Apr. 3, 1917.

5 SHEETS—SHEET 3.

Fig. 3.



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S. R. MacLANE.

DRIVING AND SPEED REGULATING MECHANISM FOR PHONOGRAPHS.

APPLICATION FILED SEPT. 2, 1915.

1,221,074.

Patented Apr. 3, 1917.

5 SHEETS—SHEET 4.

Fig. 4.

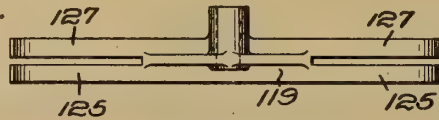


Fig. 5.

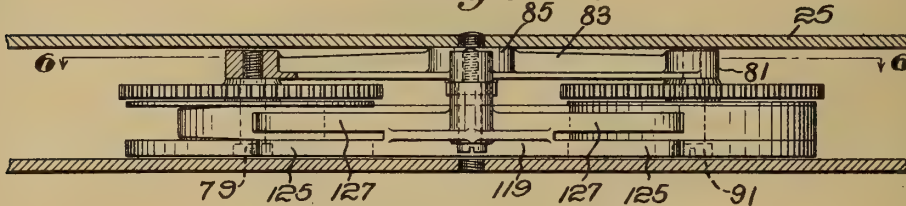


Fig. 6.

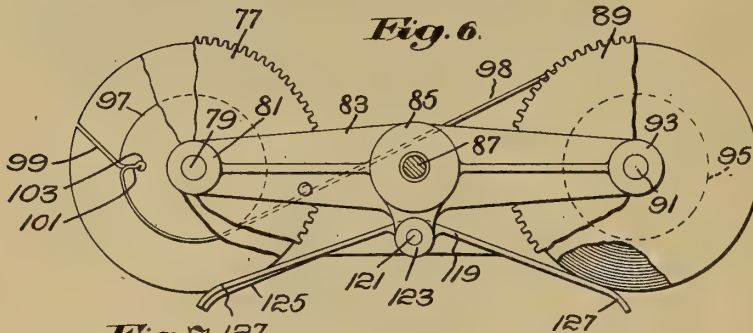


Fig. 7.

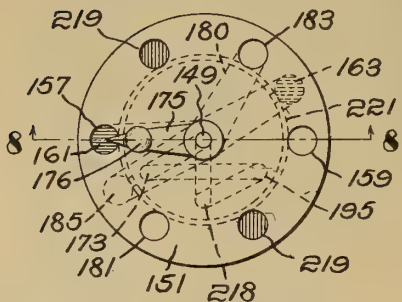


Fig. 9.

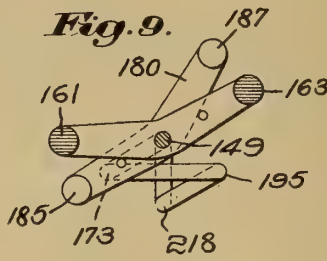


Fig. 8.

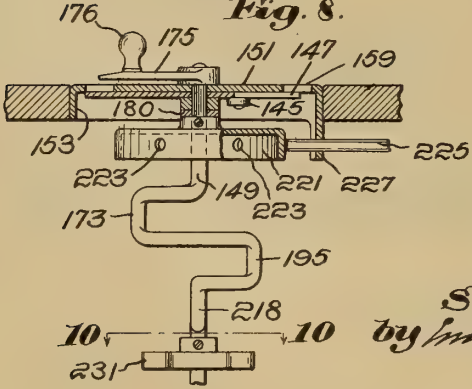
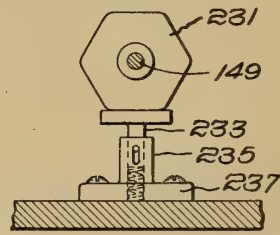


Fig. 10.



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S. R. MacLANE.
DRIVING AND SPEED REGULATING MECHANISM FOR PHONOGRAPHS.
APPLICATION FILED SEPT. 2, 1915.

1,221,074.

Patented Apr. 3, 1917.

5 SHEETS—SHEET 5.

Fig. 11.

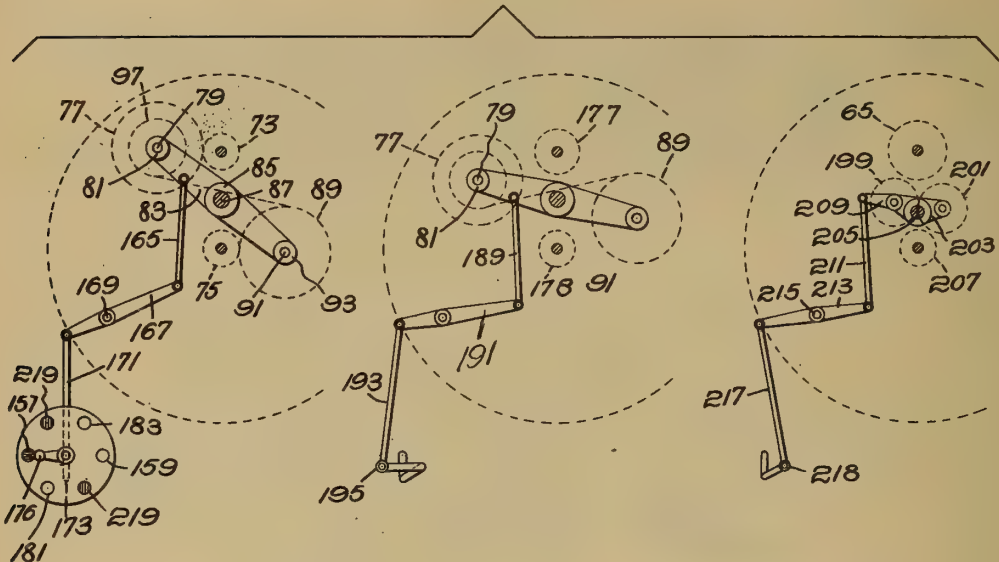
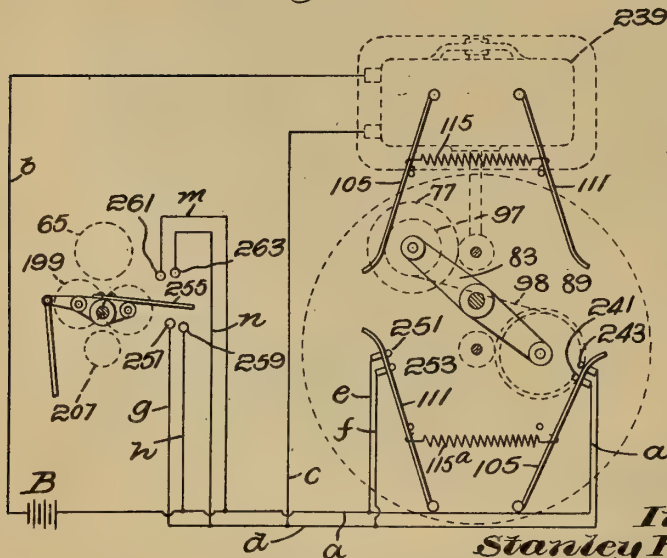


Fig. 12.



UNITED STATES PATENT OFFICE.

STANLEY R. MacLANE, OF BOSTON, MASSACHUSETTS.

DRIVING AND SPEED-REGULATING MECHANISM FOR PHONOGRAPHS.

1,221,074.

Specification of Letters Patent. Patented Apr. 3, 1917.

Application filed September 2, 1915. Serial No. 48,727.

To all whom it may concern:

Be it known that I, STANLEY R. MacLANE, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Driving and Speed-Regulating Mechanisms for Phonographs, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to phonographs, and among other objects aims to provide means for rotating the disk record table in a manner enabling economy of the disk material and an improved reproduction effect.

Heretofore, so far as I am aware, it has been customary to rotate the disk record supporting table of the commercial phonograph at a substantially uniform rate of speed throughout the playing of the record. When the stylus is traveling adjacent the periphery of the record, it must track along circles which are much longer than the circles near the center of the record, but the time occupied in making the complete rotation for each circle is the same. Consequently, the relative speed between the record and the stylus for the large circles is much greater than for the small circles. To obtain the most perfect reproduction effect, the relative speed between the record and the stylus should be substantially the same throughout the playing of the record.

A comparatively low speed is desirable for the following reasons,—

(1) It reduces the wear on the stylus and record;

(2) It reduces the scratching of the record by the stylus and the setting up of foreign vibrations;

(3) It reduces the force tending to press the stylus outward on the record track and tending to prevent perfect reproduction; and

(4) It allows sufficient time to enable the stylus to faithfully follow not only over extreme points, but also over the intermediate portions of the undulations in the record path, and thereby enables the most perfect reproduction of high pitched or soprano voices of high frequency of vibration. Obviously, if the record is rotating too rapidly

the stylus will be obliged to jump from point to point without tracking through the valleys.

There is, however, a limit to the low speed of the record. If too low, the proper reproduction cannot be obtained. It is, therefore, desirable to drive the disk at a speed as near as possible to this lowest limit.

In playing the records hitherto used, the relative speed between the stylus and record has been as near as possible to the minimum speed limit referred to, only while the stylus is tracking over the short circles near the center of the record. When the stylus is tracking over the large circles near the periphery of the record, the relative speed is much greater than is proper for the best reproduction effect.

By my invention means is provided for varying the speed of rotation of the record to compensate for the differences in speed due to the tracking of the stylus over circles of varying radii. In other words, means is provided for producing a substantially uniform relative speed between the stylus and record throughout the playing of the record. This enables the maintenance of the desirable low speed throughout the playing of the record.

This also enables a great economy in record material. Where the stylus is obliged to track over long and short circles in the same time, it consumes a greater length of record in following the large circles than would be necessary if the relative speed between the stylus and record were constant. By my invention I am, therefore, enabled to make a record on a much smaller disk area than hitherto has been used. In other words, a greater length of composition can be recorded per inch of material than hitherto has been possible.

Also by maintaining a substantially uniform relative speed between the stylus and record the longest compositions can be made on and reproduced from one record. Heretofore this has been impossible since the relative speed between the stylus and record when the former is tracking circles near the periphery of the disk, would be too high properly to reproduce the composition.

The character of the invention may be best understood by reference to the following description of an illustrative embodi-

ment thereof shown in the accompanying drawings, wherein,—

Figure 1 is a vertical section through an illustrative phonograph shown herein as embodying the invention;

Fig. 2 is a horizontal section taken on line 2—2 of Fig. 1, a corner of the phonograph appearing in plan to show a controlling device;

Fig. 3 is a horizontal section taken on line 3—3 of Fig. 1, also showing the controlling device in plan;

Fig. 4 is a detail of a brake member to be referred to;

Fig. 5 on an enlarged scale is a side elevation of transmission elements shown in Fig. 2;

Fig. 6 is a horizontal section taken on line 6—6 of Fig. 5;

Fig. 7 is a detail plan view of the controlling device;

Fig. 8 is a vertical section taken on line 8—8 of Fig. 7;

Fig. 9 is a horizontal section taken directly beneath the dial plate of the controller shown in Figs. 7 and 8;

Fig. 10 is a horizontal section taken on line 10—10 of Fig. 8;

Fig. 11 is a diagram showing the inoperative positions of the second accelerated record transmission unit and the constant speed record transmission unit while the first accelerated record transmission unit is in operation;

Fig. 12 is a plan view of a motor and electrical connections controlled by a transmitting unit; and

Fig. 13 is a sectional detail to be referred to.

Referring to the drawings, the illustrative phonograph shown therein as embodying the invention, comprises a casing 1 (Fig. 1) having a partition 3 therein combining with portions of the bottom, top and side walls to form a sound amplifying chamber. Communicating with the amplifier is a short tube 5 (Fig. 1) projecting upward from the top of the casing and formed to receive a sound conducting tube 7 on the outer free end of which is a sound box 9 connected to a stylus bar 11 carrying a stylus 13.

Above the top of the casing is a table 15 for receiving a disk record 17. The table is mounted on the upper end of a shaft 19 projecting downward into the casing and having its lower end journaled in a bearing 21 on a frame 23 secured to the bottom of the casing. The shaft also is journaled in an upper plate 25 and a lower plate 27 held in spaced relation by bolts 29 entered through sleeves 31. To confine the shaft 19 against movement in the direction of the axis thereof, collars 33 are secured thereto and adapted to bear against the plates 25 and 27.

Next will be described the mechanism for

rotating the table shaft 19. To accomplish this, there may be provided the usual spring motor 35 (Figs. 1 and 3) having a shaft journaled in bearings in uprights 37 rising from a bed-plate 39 secured to the bottom of the casing. To wind the spring motor, a handle shaft 41 may be tapped into a socket in the end of the motor shaft.

A gear 43 fast on the motor shaft, through an intermediate pinion 45, drives a pinion 47 fast on a shaft 49 journaled in bearings in brackets 51 and 53 rising from the motor bed-plate 39. The shaft 49 may be extended beyond its bearing 51 and have a gear 54 fast thereon meshing with a pinion 54^a on a shaft 55 journaled in bearings in brackets mounted on the bottom of the casing. The shaft 55 may have the usual governor 55^a mounted thereon. A bevel pinion 57 (Fig. 1) is mounted fast on the governor driving shaft 49 and is adapted to drive a bevel pinion 59 fast on an upwardly extending stud shaft 61 journaled in bearings in the bracket 53. On the upper end of the stud shaft is a gear 63 meshing with a gear 65 fast on a vertical shaft 67 parallel to the table shaft 19 referred to, and having its lower end journaled in a bearing 69 on the frame 23 referred to. The shaft 67 extends upward through and is journaled in the lower plate 27 and the upper end thereof is journaled in a bearing in a boss 71 depending from the plate 25. The spring motor, governor and pinions described, will serve to drive the shaft 67 at a uniform speed.

Next will be described the transmission from the motor driven shaft to the table shaft. To accomplish this, a pinion 73 (Figs. 1 and 2) is mounted fast on the motor driven shaft 67, and a pinion 75 is mounted fast on the table shaft 19 in the same horizontal plane with the pinion 73. To transmit the drive from the pinion 73 to the pinion 75, a gear 77 is journaled on a stud shaft 79 having a reduced end (Fig. 5) tapped into a boss 81 on one end of a rocking lever or carrier 83 having a hub 85 journaled on a stud bolt 87 tapped into the plate 25. A gear 89 similar to the gear 77 is journaled on a stud shaft 91 tapped in a boss 93 at the opposite end of the rocking lever 83. When the rocking lever 83 is in its position shown in full lines in Fig. 2, the large gears 77 and 89 are in mesh with the pinions 73 and 75 respectively.

Next will be described the transmission between the gears 77 and 89. A spool 95 is journaled on the stud shaft 91 and secured to the gear 89. A spool 97 is journaled on the stud shaft 79 and secured to the gear 77. A transmission tape 98 of copper or other flexible non-extensible material has one end anchored to the spool 95 and its opposite end anchored to the spool 97. Each end of the tape may be conveniently anchored by cut-

ting a kerf 99 through one of the flanges of the spool and a key-hole slot 101 in the body of the spool. The end of the tape is bent over to present an anchor enlargement 103.

To connect the tape to the spool, the edge of an end portion thereof is presented to the communicating kerf and key-hole slot, and the tape is slid laterally therein until its trailing edge passes beyond the flange of the spool. Then the tape is bent sharply over the body of the spool at the end of the key-hole slot and wrapped about the body of the spool as shown in Fig. 6, thereby securely anchoring the same thereto.

The tape is led from one side of one spool diagonally past the rocking lever to the opposite side of the other spool. As a result, when one of the spools is rotated in one direction, it will draw on the transmission tape and rotate the other spool in an opposite direction, in the same sense as a crossed belt will produce a reversal of rotation between pulleys.

When the rocking frame is in the position shown in full lines in Fig. 2, the motor driven shaft 67 turning at a constant speed, will rotate the pinion 73, said pinion in turn driving the large gear 77 and spool 97. The latter will wind the transmission tape 98 thereon, and thereby unwind said tape from the spool 95. This will rotate the latter in an opposite direction and with it the gear 89, said gear driving the pinion 75 on the shaft 19, and thereby rotating the table shaft.

As the driving continues, the effective transmission radius of the wound tape on the spool 97 will gradually increase, thereby producing an acceleration in the rotation of the record table. On each complete rotation of the spool 97, the effective transmission radius will increase by an amount equal to the thickness of the transmission tape.

While the effective transmission radius of the wound tape on the driving spool 97 is gradually increasing, the effective transmission radius of the wound tape on the driven spool 95 is gradually decreasing. On each complete rotation of the driven spool 95, its effective transmission radius decreases by an amount equal to the thickness of the transmission tape.

The decrease in the effective transmission radius of the wound tape on the driven spool produces a gradual increase in the acceleration produced by the driving spool, so that a constantly varying angular acceleration is imparted to the table shaft.

The transmission mechanism from the motor-driven shaft 67 to the table shaft 19 is designed according to the size of record to be driven. For example, if a twelve inch record is to be used, the transmission is calculated to produce an acceleration in the rotation of the table throughout the transit of

the stylus from the outermost circle to the innermost circle on the record, and thereby compensates for the reduction in relative travel between the stylus and record which would occur if the table were rotated at a uniform rate of speed.

As a result the relative speed between the stylus and record is maintained substantially uniform throughout the tracking of the stylus from the outermost to the innermost circle, with the resulting improvement in the reproduction effect, the elimination of scratching, the objectionable outward pressure of the stylus on the record track, and the economy of record material, referred to.

When the playing of a record has been completed and it is desired to commence playing a second record, the rocking lever 83 is shifted from its full line to its dotted line position shown in Fig. 2, thereby causing the gears 77 and 89 to exchange places, the gear 89 then becoming the driving gear, and the gear 77 becoming the driven gear. Thus by an extremely simple adjustment the necessity for first rewinding the tape back onto the spool 97 before the playing of another record, is eliminated.

When the rocking lever has been shifted as described, the motor-driven shaft 67 through its pinion 73, will rotate the gear 89, the latter rotating the spool 95 and causing the winding of the transmission tape thereon and the unwinding of the tape from the spool 97. This spool, through the gear 77 secured thereto, will rotate the pinion 75 on the table shaft 19 and thereby rotate the table.

The table shaft will be driven in the same direction as before, but the gears 77 and 89 will be rotated oppositely to their previous directions.

To retard the unwinding of the tape from the spools and to prevent the opening out of the tape coils thereon, there may be provided diagonally opposite arms 105 (Fig. 2) fulcrumed on pins 107 secured to a plate 109 intermediate the upper and lower plates 25 and 27 referred to and held in position by the sleeves 31 and bolts 29; and diagonally opposite arms 111 fulcrumed on pins 113 secured to said plate 109.

The arms are pressed against the tape wound on the spools by helical springs 115 and 115^a, connected thereto. The movement of said arms by said springs may be limited by stop pins 117 secured to the plate 109. These stops will serve to prevent engagement of one pair of diagonally opposite arms with the mechanism, while the other pair of diagonally opposite arms is in active engagement with the tape. These arms will also assist in holding the spool gears 77 and 89 in mesh with the pinions 73 and 75 in their different positions of adjustment.

The retarding force produced by the en-

gagement of said arms with said tape, the friction of the rotating parts of the transmission in their bearings, and the drag of the stylus on the record, combine to resist the pull on the transmission tape. The motor driven shaft is rotated with a substantially constant force, but the work on said shaft increases during the course of the playing of a record owing to the acceleration of the table shaft. For example, at the commencement of the playing of a record, if the spool 97 is empty and the spool 95 is filled, the pinion 73 will rotate said spool 97 with a mechanical advantage which gradually decreases as the tape builds up its effective transmission radius on said spool, and the tape will draw on the spool 95 with a mechanical advantage, gradually decreasing as the effective transmission radius of the tape accumulated thereon decreases. Both of these factors combine to gradually increase the work on the motor-driven shaft as the table shaft is progressively accelerated.

The helical spring 115^a which draws the arms 105 and 111 into engagement with the tape on the unwinding spools, may be of greater strength than the spring 115 and serve advantageously to compensate for this increase in the work. As the tape on a spool unwinds, the active arm moves gradually inward toward the axis of the spool and therefore the tension of the helical spring is gradually lessened and the brake action of the arm on the spool is gradually reduced, thereby desirably reducing the work on the motor-driven shaft referred to proportionately to the increase of the work on said shaft due to the acceleration.

Next will be described means for automatically stopping the rotation of the table when the playing of the record thereon has been completed. To accomplish this, there is provided a brake bar 119 (Figs. 2, 4, 5 and 6) fulcrumed centrally between its ends on a pin 121 carried by ears 123 projecting from the hub 85 of the rocking lever 83. The ends of this bar are forked to present resilient brake shoe members 125 for engagement with flanges of the spools and resilient brake applying members 127 for engagement with the tape wound on the spools.

The operation of the brake stopping means is as follows:

It may be supposed, for example, the tape is being wound on the spool 95 and unwound from the spool 97. The coils of tape will accumulate on the spool 95 until the wound material is built up to a point where it will come into engagement with the brake actuating member 127 as shown in Fig. 6. The slight additional winding of the tape on the spool will turn the bar 119 in a clockwise direction (Fig. 6) and thereby press

the brake shoe 125 against a flange of the spool 97, and thereby automatically arrest further rotation of the spools and tape.

When the rocking frame is shifted from its full line to its dotted line position to play the next record, the drive will automatically commence promptly on the throwing of the gears 77 and 89 into mesh with the pinions 75 and 73 without the brake being effective to prevent the starting of the drive. This is due to the fact that the tape is now being wound on the spool 97 and unwound from the spool 95. The driving force applied to the spool 97 drags on the tape and tends to pull the same away from the brake actuating member 127, thereby automatically releasing the brake shoe 125 from the spool 97. When sufficient tape material has accumulated on the winding spool 97, it will engage the actuating arm 127 and apply the brake shoe 125 to the flange of the unwinding spool in a manner similar to that described.

An important feature of the invention relates to means for indicating the two positions of the carrier for the spools and tape. To accomplish this, there is provided a follower 129 (Fig. 2) pivoted intermediate its ends on a pin 131 secured to the upper plate 25 referred to. This follower has one end 133 for engagement with the tape on the spool 97, and an opposite end 135 for engagement with the tape on the spool 95. A short arm 137 projecting from the follower, is connected by a rod 139 with one arm of a bell crank 141 fulcrumed on a pin 143 secured to the plate 25. The other arm of the bell crank is connected by a rod 145 with an arm 147 of an index lever pivoted loosely on a crank shaft 149 (Figs. 2 and 8), the upper end of which is journaled in a dial plate 151 having a flange 153 set in an aperture in the top of the phonograph case and provided with an arm 153^a (Fig. 1) secured to the upper plate 25 referred to. The lower end of said shaft is journaled in a bearing in an extension 155 (Fig. 1) on the bottom plate 27 referred to.

The dial plate 151 has a pair of holes 157 and 159 (Fig. 2) therein. The arm 147 of the index lever is offset slightly from an arm 147^a of said lever. The end of the arm 147^a has a button 161 for registration with the hole 157, and the arm 147 has a button 163 for registration with the hole 159.

The registration of the buttons with the holes indicates the directions the rocking spool carrier should be shifted to play the next record. To rock said carrier, it is connected by a link 165 with a lever 167 fulcrumed intermediate its ends on a pin 169 fast on the plate 25, said lever being connected by a link 171 with a crank 173 (Fig. 8) on the shaft 149 referred to. A pointer arm 175 is mounted fast on the upper end

of said shaft and has a handle 176 whereby it may be rotated over the upper face of the dial 151.

In the course of the playing of a record, as the tape accumulates on the winding spool 97, the follower 129 will be rocked in a clockwise direction (Fig. 2), thereby shifting the button 161 out of registration with the hole 157 and bringing the button 163 into registration with the hole 159. This shows that in playing the next record the pointer should be shifted from its position shown in full lines in Fig. 2 to point to the hole 159. In the course of the turning of the pointer 157 to the hole 159, it will operate through the crank shaft, the link 171, lever 167 and link 165 to rock the spool carrier from its position shown in full lines to its position shown in dotted lines in Fig. 2. While the next record is being played, the accumulating tape coils wound on the spool 95 will shift the follower in a contraclockwise direction (Fig. 2), thereby shifting the index lever to move the button 163 out of registration with the hole 159 and the button 161 into registration with the hole 157. This indicates that in playing the next record the pointer should be turned to point to the hole 157 as shown in Fig. 2.

It will be understood that as soon as the spool carrier is shifted from one position to the other, the brake stop automatically becomes released and the playing of the record commences. Thus, the indicator arm serves the dual function of shifting the spool carrier and the starting of the driving of the table.

If desired, the table may be arrested by the hand of the operator before the playing of the record is completed, and the pointer arm may be turned to shift the spool carrier and thereby commence rewinding the spool partially unwound.

The gears, spools, and shiftable spool carrier interposed between the motor driven shaft 67 and the table shaft 19, constitute a transmission unit appropriate for the rotating of the table in playing a record of a predetermined size. The records employed commercially are of standard sizes, and usually merely two different sizes are marketed. The transmission unit just described may be suitable for driving a twelve inch record. If it is desired to drive a nine inch record, there may be designed a second transmission unit between the motor driven shaft 67 and the table shaft 19, similar to the one just described, but with different proportions. This second unit is adapted to cooperate with a pinion 177 (Fig. 1) on the motor driven shaft 67 and with a pinion 178 on the table shaft 19; its tape is engaged by arms 179; the spools are automatically arrested by a brake stop bar; and a follower

and connections to an index lever 180 (Fig. 9) may be provided, all similar to the corresponding parts described for the first unit.

The dial plate 151 referred to may be provided with a second pair of diametrically opposed holes 181 and 183 (Figs. 2 and 7) and the index lever 180 may have a button 185 adapted for registration with the hole 181, and a button 187 adapted for registration with the hole 183. The index lever 180 may be controlled by a follower and connections cooperating with the tape wound on the spools of the second unit similar to those described for the first unit.

The spool carrier for the second transmission unit is connected by a link 189 (Fig. 1) with a lever 191 fulcrumed intermediate its ends on a pin secured to the plate 109, said lever being connected by a link 193 with a crank 195 (Fig. 8) on the shaft 149 referred to.

When the pointer arm 175 is shifted to the holes 181 and 183, the spool carrier of the second transmission unit will be shifted into its different positions to bring its large gears in mesh with the pinions 177 and 178 of the motor-driven and table shafts in a manner similar to that described for the first unit.

Where the table is driven at an accelerated rate of speed to compensate for the reduction in the relative speed between the stylus and record as the former moves radially inward on the latter, it is necessary that the record reproduced should have been made on a machine in which the table is driven by an accelerating mechanism similar to that used in rotating the table for effecting the reproduction. In other words, the record reproduced must have been made on a machine in which the table is turned so as to maintain a substantially constant relative speed between the record and stylus throughout the making of the record. Therefore the machine as thus far described is not adapted to reproduce the present commercial records which are adapted to be played on a table which is rotated at a uniform rate of speed.

To give the machine the capacity for playing the commercial records now on the market, it may be provided with transmission means for turning the table at a constant rate of speed. To accomplish this, a gear 65 (Figs. 1 and 3) is mounted on the motor driven shaft 67 and is adapted to mesh with either a gear 199 or a gear 201 journaled on stud shafts on a rocking carrier 203 fulcrumed on a stud shaft 205 secured to the lower plate 27. Either of the gears 199 and 201 is adapted to mesh with a pinion 207 on the table shaft 19.

To shift the gear carrier 203, it is provided with an arm 209 connected by a link 211 with a lever 213 fulcrumed intermediate its ends on a pin 215 secured to the plate 27, said lever being connected by a link 217

with a crank 218 (Fig. 8) on the shaft 149 referred to.

To indicate the adjustment of the crank shaft to bring the gear carrier 203 in position to produce the constant rotation of the record, the dial plate 151 may be provided with a third pair of holes 219 (Figs. 2 and 3). When the pointer arm is directed to either of the holes 219, the gear carrier 203 will be shifted to render its gears active for transmitting a constant speed of rotation to the table.

To facilitate the understanding of the proper adjustment of the pointer arm for driving the table for the different sized accelerated speed records or the constant speed records, the following arrangement may be adopted. The twelve inch record may have a central zone colored blue, and the index lever for the twelve inch record may have its buttons 161 and 163 colored blue. The nine inch record may have a central zone colored white, and the index lever for the nine inch record may have its buttons 185 and 187 colored white. The holes 219 for the constant speed may be plugged with buttons colored red. If a blue button is visible at the dial plate under the pointer arm, it indicates the transmission unit for the blue center, twelve inch record is in active position for playing. If a white button is visible at the dial plate, it shows the transmission unit for a white center, nine inch record is in active position for playing. With the pointer arm out of registration with the white button and blue button holes and in registration with a red button, the transmission for the constant speed is in position for playing.

The design of the transmission units for different sized accelerated records may be readily determined from considerations which will be apparent from the above description including the diameters of the inner and outermost groove circles of the record and the constant speed of the motor-driven shaft. The relative diameters of the gears, the diameters of the spools and the thickness and length of the transmission tape are, of course, factors in determining the amount and character of the acceleration imparted from the motor-driven constant speed shaft to the accelerated table shaft.

In making records in accordance with the present invention, as a preliminary step the time required to play a composition should be determined. This would indicate the size of record appropriate for recording the composition,—for example, whether the record should be nine inches or twelve inches in diameter.

The construction and proportions of the transmission spools and tape may be designed with respect to definite large and small circles of the record marking the

boundaries of the area covered by the record groove.

Compositions of varying length may be recorded within this area, but the governor must be set to rotate more rapidly in recording a short composition than in recording a long composition.

This is essential since each time a record is played the tape should be wound from one spool to the other so as to be in readiness to rewind substantially its full length in playing the next record.

If a record larger than one having a recording area bounded by the dimension referred to is to be used, a spool and tape mechanism of different dimensions is employed.

The rotation of an accelerated record does not need necessarily to begin after the transmission tape has been completely unwound from either of the spools, but it may begin somewhat before it is completely unwound, since a slight change in the position of the stylus with respect to the winding of the tape on the spools will not produce a change from normal reproduction sufficient to be detected by the human ear.

The crank shaft and its connections with the carriers of the first, second and constant speed units, may be relied upon to determine the different positions of adjustment of the carriers and to hold the latter in said positions. When the carriers for any of the units are shifted to bring their gears into mesh with the motor-driven shaft and table shaft pinions, the crank for such carrier will be in dead center position so that the turning of said crank in either direction will draw the carrier gears away from said pinions. For example, in Fig. 11 the carrier gears 77 and 89 for the first unit are shown in mesh with the pinions 73 and 75 and the crank 173 is in its dead center position. If the crank is shifted slightly in either a clockwise or a contraclockwise direction, it will operate through the connections between it and said carrier to rock the latter and move the gears thereof away from the pinions. When the carrier for the first unit is shifted to its position shown in Fig. 11 with its gears meshing with the pinions, the gears for the second carrier will be out of mesh with the pinions for the second unit, and the gears of the carrier for the constant speed unit will be out of mesh with the motor-driven shaft and table shaft gears of said unit.

Similarly, when the crank 195 for the second unit is in dead center position, the carrier of said unit will be shifted to bring its gears into engagement with the pinions thereof, and the carriers for the first and constant speed units will be in inactive positions.

Similarly, when the shaft 218 for the con-

stant speed unit is on dead center its gears will be thrown into active position and the gears for the carriers of the first and second units will be in inactive positions.

The cranks for the several units are disposed on their shaft in appropriate angular relation to maintain the relative positions of the carriers as above described.

The tempo may be varied by the usual speed controlling device coöperating with the governor and therefore need not be shown herein. The relative speed between the stylus and record, however, will remain substantially constant throughout the playing of a record after its desired tempo is determined.

To prevent the interruption of the playing of an accelerated record, the crank shaft 149 may be provided with a disk 221 (Fig. 8) fast thereon, having a flange containing diametrically opposed holes 223. A rod 225 is entered through an aperture in a lip 227 depending from the dial plate flange 153 and is connected to the handle of the usual turn table brake 229 (Fig. 3). When the crank shaft is turned with the pointer arm in registration with either of the red buttons, one or another of the holes 223 will be in registration with the rod 225, thereby permitting the rod to pass therethrough and the brake 229 to be applied as desired. When, however, the crank shaft is turned to bring the pointer arm in registration with either the blue or the white buttons, the solid portion of the flange of the disk 221 will be presented against the rod 225 and will prevent the application of the brake 229 to the record table and the arrest of the latter thereby.

To hold the crank shaft in its different positions of adjustment, a hexagonal wheel 231 (Figs. 1 and 10) may be mounted fast thereon having flat faces being adapted to be engaged by a spring-pressed plunger 233 mounted in a sleeve 235 on a plate 237 secured to one of the walls of the phonograph casing.

In some cases it may be desirable to drive the mechanism by means of an electric motor. To accomplish this there may be provided an electric motor 239 (Fig. 12) which would be substituted for the spring motor 35 and the governor described, and would be provided with usual governing means which need not be shown herein.

Means may be provided for automatically stopping the motor on the completion of the playing of a record. To accomplish this, the roller contacts 241 and 243 (Fig. 13) may be provided on the ends of binding posts 245 and 247 projecting through a carrier 249 adapted to move somewhat in a slot in one of the spring-pressed arms 105 engaging the tape coils on the spool of a carrier. The contact 241 may be connected

by a wire *a* with a battery B connected in turn by a wire *b* with the electric motor 239, the latter being connected by a wire *c* with a wire *d* connected to the contact 243.

On the commencement of the playing of a record the contacts 241 and 243 will engage the metal tape wound on the filled spool and said tape will serve as a bridge contact for connecting the contacts 241 and 243, thereby completing the circuit to the motor.

In the course of the playing of the record, the tape will be wound from the filled spool to the other spool and finally the contacts will pass from the end of the tape onto a bare part of the spool. Preferably the spool is formed of insulation material so that promptly on the passage of said contacts from the tape to the bare spool, the circuit to the motor will be broken and it will be arrested.

The contact carrier 249 may readily move slightly relatively to the arm 105 and insure the engagement of the contacts with the tape and the bare spool. Obviously when the arm has moved into engagement with the spool, its point of contact therewith is nearer the free end of the arm than when the latter engages the tape wound thereon.

The electrical connections described will serve to control the stopping of the motor when the carrier is in one of its positions. To arrest the motor when the carrier is shifted to its other position, one of the spring-pressed arms 111 may be equipped with a contact carrier and wheel contacts 251 and 253 similar to those described for the arm 105. The contact 251 may be connected by a wire *e* with the wire *a* referred to, and the contact 253 may be connected by a wire *f* with the wire *d* referred to. As a result, when the carrier is shifted to bring the tape into engagement with the contacts 251 and 253, the motor will be started and will continue to run until the tape is unwound from the spool and the bare spool engages said contacts. Then the circuit will be automatically broken to the motor and the latter will be arrested.

Obviously, the shifting of the carrier serves not only to bring its gear into mesh with the motor-driven shaft and table shaft pinions, but also automatically to complete the circuit to the motor to start the same.

The automatic motor stopping means for both the first and second transmission units is the same and therefore a description of the stopping means for one will suffice for both.

This automatic motor stopping means desirably coöperates with the brakes described for arresting the rotation of the spools since the power may be cut off from the motor and thereby substantially relieve the work of the brakes in arresting the spools. Obviously,

the brakes can much more readily overcome the kinetic energy of the moving parts after the power of the motor has been cut off.

To complete the circuit to start the motor
 5 on the shifting of the carrier of the constant speed unit into effective position, the latter may be provided with a switch arm 255 (Fig. 12) adapted to bridge fixed contacts 257 and 259 adjacent thereto, the
 10 former being connected by a wire *g* with the wire *d* referred to, and the latter by wire *h* with the wire *a* referred to. When the carrier is shifted to one of its active positions, the switch arm 255 will connect the contacts
 15 257 and 259 and thereby complete the circuit to the motor. To complete the circuit to the motor when the carrier is shifted to its opposite effective position there may be provided fixed contacts 261 and 263, the former
 20 being connected by a wire *m* with the wire *a* referred to, and the latter being connected by the wire *n* with the wire *d* referred to. When the switch 255 engages these contacts the circuit will be completed to the motor.
 25 The three transmission units may be carried by and so connected with the upper and lower plates 25 and the intermediate plate 109 bound together by the bolts 29 and spacing sleeves 31 referred to, that all of said
 30 units may be readily bodily removed from the casing 1 for purposes of repair or replacement of parts thereof.

Having described one illustrative embodiment of the invention without limiting the
 35 same thereto, what I claim as new and desire to secure by Letters Patent, is:—

1. In a phonograph, the combination with a record support, of means to rotate said support including a pair of rotors, a flexible
 40 transmission member connecting the latter, means to operate said rotors to draw said member alternately in opposite directions to and from said rotors, and means to drive said support from the latter while said member
 45 is being drawn in either of said directions.

2. In a phonograph, the combination with a record support, of means to rotate said support including a pair of rotors, a flexible
 50 transmission member connecting the latter, means to operate said rotors to draw said member to and from the same, and means to drive said support from either of said rotors.

3. In a phonograph, the combination with
 55 a record support, of means to rotate said support including a pair of rotors, a flexible transmission member connecting the latter, and means to operate said rotors to draw said member to and from the same, said rotors having provision permitting them to
 60 be alternately driven by said transmission member to impart rotation to said support.

4. In a phonograph the combination with a support for a disk record, of mechanisms
 65 to positively drive said support with pro-

gressively varying speed, and means providing for the playing of successive records without interruption from said mechanisms.

5. In a phonograph, the combination with a record support, of means to rotate said support including a pair of rotors, and a member connecting the latter having provision for transmitting rotative movement from said motor to said support when wound on or unwound from either of said rotors. 70

6. In a phonograph, the combination with a record support, of means to rotate said support including a pair of rotors, a flexible transmission member connecting the latter, and means coöperating with said rotors for rotating said support in the same direction while said rotors alternately rotate in opposite directions. 75

7. In a phonograph, the combination with a record support, of means to rotate said support including a pair of rotors, a flexible transmission member connecting the latter, and means to rotate said support while driving said rotors alternately in opposite directions to wind said member on and unwind the same from said rotors. 80

8. In a phonograph, the combination with a record support, of means to rotate said support to produce a substantially constant relative speed between a stylus and a record on said support, comprising a pair of rotors, a flexible transmission member connecting the latter, and means coöperating with said rotors and member to drive said support while said member is being wound on or unwound from either of said rotors. 85

9. In a phonograph, the combination with a record support, of means to rotate said support with a progressively increasing angular acceleration including a pair of rotors, and a flexible transmission member connecting the latter having provision for transmitting rotation to said support while winding on or unwinding from either of said rotors. 90

10. In a phonograph, the combination with a record support, of means to rotate said support including a pair of rotors, a transmission member connecting the latter, gears for said rotors, driving and driven gears adjacent said rotors, and means bodily to shift said rotors to cause their gears to mesh with either said driving or driven gears. 95

11. In a phonograph, the combination with a record support 15, of means to rotate said support including a pair of rotors 95, 97, a transmission member 98 connecting said rotors, a carrier 83 for said rotors for bodily shifting the same to different positions, and means to impart rotation from said rotors to said support when the former are in either of said positions. 100

12. In a phonograph, the combination with a record support, of means to rotate 130

said support comprising a pair of rotors, a transmission member connecting the latter, and means including a rotative carrier for said rotors shiftable to render the latter alternately effective as driving and driven elements.

13. In a phonograph, the combination with a pair of rotors, of a flexible transmission member connecting said rotors, means for driving one of said rotors, and a record support driven by the other rotor.

14. In a phonograph, the combination with a support for a disk record, of mechanism to positively rotate said support with a gradually increasing angular acceleration and having means providing for playing successive records without interruption from said mechanism.

15. In a phonograph, the combination with a record support, of means to rotate said support including a pair of rotors, a flexible transmission member connecting the latter, and means to engage said member and prevent the coils thereof from opening out on said rotors.

16. In a phonograph, the combination with a record support, of means for rotating said support including a pair of rotors and a flexible transmission member connecting said rotors, and means responsive to the accumulation of said member on a rotor for automatically arresting rotation of said rotors.

17. In a phonograph, the combination with a record support, of means to rotate said support including a pair of rotors and a flexible transmission member connecting the latter, and means coacting with said member as it accumulates on one of said rotors for automatically arresting said rotors.

18. In a phonograph, the combination with a record support, of means to rotate said support including a pair of rotors, a flexible transmission member connecting the latter, a carrier for said rotors shiftable to bring the latter in different positions for winding and unwinding said member, and means to prevent rotation of said rotors during the shifting of said carrier.

19. In a phonograph, the combination with a record support, of means to rotate said support including a pair of rotors and a flexible transmission member connecting the latter, and means automatically to arrest said rotors before said member is completely unwound from either of them.

20. In a phonograph, the combination with a record support, of means to rotate said support including a driving rotor driven at a fixed speed; a flexible tape winding on itself on said driving rotor; an unwinding rotor from which said flexible tape is unwound from a coil built up on itself; and a driving connection between the unwinding rotor and the record support, where-

by a gradually increasing angular acceleration is imparted to said record support.

21. In a phonograph, the combination with a record support 15, of means to rotate said support including a pair of rotors 95, 97 and a transmission member 98 connecting the latter, and a brake 119, 125, 127 for automatically arresting said rotors.

22. In a phonograph, the combination with a record support 15, of means to rotate said support including a pair of rotors 95, 97 and a flexible transmission member 98 connecting the latter, and brake means comprising a member 127 to engage a portion of the transmission member wound on one of said rotors, and a member 125 to engage the other rotor.

23. In a phonograph, the combination with a record support, of mechanism to impart a gradually accelerated rotation thereto, a manually operable brake for said support, and means to prevent operation of said brake while said support is thus rotated.

24. In a phonograph, the combination with a record support 15, of mechanism to rotate said support including a controller 175, a manually operable brake 229 for said support, an element 225 connected to said brake, and a member 221 connected to said controller to prevent operation of said brake.

25. In a phonograph, the combination with a record support 15, of mechanism to impart rotation thereto with a gradually increasing angular acceleration, mechanism to impart rotation to said support at a constant angular speed, a controller 175 for said mechanisms, a brake 229 for said support, and means 221, 223, 225 to prevent application of said brake during operation of said first-named mechanism and permit application of said brake during operation of said second-named mechanism.

26. In a phonograph, the combination of a record support with a driving and a driven shaft, a carrier, rotative elements mounted thereon, flexible transmission means connecting said elements, gears for the latter, gears on said shafts, and means for shifting said carrier to cause said rotative element to mesh with either of said shaft gears.

27. In a phonograph, the combination of a record support with driving means therefor including a fulcrumed carrier, rotors mounted thereon, a flexible member connecting said rotors, gears for said rotors mounted on said carrier, and driving and driven gears, said carrier being adjustable to shift said rotor gears into and out of engagement with either of said driving and driven gears.

28. In a phonograph, the combination of a record support with means for rotating said support including driving and driven shafts, gears thereon, a pair of rotors, a flexible transmission member connecting said rotors, gears for said rotors, a carrier for

said gears and rotors shiftable to cause said rotor gears to mesh with either of said shaft gears, and means for holding said carrier in its different positions of adjustment.

5 29. In a phonograph, the combination of a record support with means for rotating said support including driving and driven shafts, gears thereon, a pair of rotors, a flexible transmission member connecting said
10 rotors, gears for said rotors, a carrier for said gears and rotors shiftable to cause said rotor gears to mesh with either of said shaft gears, and means for yieldably holding the carrier in its different positions of adjust-
15 ment.

30. In a phonograph, the combination of a record support with means for rotating said support including driving and driven shafts, gears thereon, a pair of rotors, a
20 flexible transmission member adapted to wind on said rotors, gears for said rotors, a carrier for said gears and spools shiftable to cause said rotor gears to mesh with either of said shaft gears, arms for engagement
25 with portions of said member wound on said rotors, spring means for drawing said arms toward said rotors, and stop means for limiting the movement of said arms.

31. In a phonograph, the combination of
30 a record support with means for rotating said support including a pair of rotors, a flexible transmission member connecting said rotors, means for alternately rotating said rotors in opposite directions to wind said
35 member to and from the same, and means independent of the length of said member for automatically arresting rotation of the rotors on the completion of the playing of the record.

40 32. In a phonograph, the combination of a record support with means for rotating the same including a pair of rotative elements, a flexible transmission member connecting said elements, means independent of
45 the length of said member for rotating said elements, and means for automatically arresting the rotation of said elements on the completion of the playing of the record.

33. In a phonograph, the combination of
50 a record support with means for rotating said support including a pair of rotors, a flexible transmission member connecting said rotors, means for alternately rotating said rotors in opposite directions, and means con-
55 trolled by the accumulation of said transmission member on a rotor for automatically arresting rotation of the rotors.

34. In a phonograph, the combination of
60 a record support with means for rotating said support including a pair of rotors, a transmission member connecting said rotors, and means automatically to arrest rotation of said rotors including a brake shoe member for engagement with one of the rotors

and a brake applying member for engage- 65
ment with the transmission member wound on the other rotor.

35. In a phonograph, the combination of a record support with means for rotating said support including a pair of rotors, a
70 transmission tape connecting said rotors, and means for automatically arresting rotation of said rotors including brake applying members coöperating with the tape wound on the rotors, and brake shoe members for
75 engagement with said rotors.

36. In a phonograph, the combination of a record support with means for rotating said support including a carrier, rotors
80 mounted thereon, a transmission member connecting said rotors, and a brake bar mounted on said carrier having a brake shoe member for engagement with one of the rotors and a brake applying member for en-
85 gagement with the member wound on the other rotor.

37. In a phonograph, the combination of a record support with means for rotating said support including a carrier, rotors
90 mounted thereon, flexible transmission means connecting said rotors, and means for automatically arresting said rotors, including a brake member pivotally mounted on said carrier having provision for automatically
95 setting the same on the accumulation of a predetermined amount of said transmission means on a rotor.

38. In a phonograph, the combination of a record support with means for rotating said support including a carrier, rotative
100 elements mounted thereon, flexible transmission means connecting said elements, means for shifting said carrier to reverse the direction of rotation of said elements, and index
105 means for indicating the positions of said carrier.

39. In a phonograph, the combination of a record support with means for rotating said support including a carrier, rotative
110 elements mounted thereon, a transmission tape connecting said elements, means for shifting said carrier to reverse the direction of rotation of said elements, a dial, and index means coöperating with said dial for
115 indicating the positions of said carrier.

40. In a phonograph, the combination of a record support with means for rotating said support including reversible means, a
120 carrier for the latter adjustable to different positions, a dial, and index means coöperating with said dial for indicating the positions of said carrier.

41. In a phonograph, the combination of a record support with means for rotating said support including means for progres-
125 sively varying the speed of rotation of said support while the record is being played, a dial, and index means coöperating therewith

for indicating adjustment of said speed varying means to render the same effective to commence rotation of said support.

42. In a phonograph, the combination of
5 a record support with means for rotating said support including a carrier, rotors mounted on said carrier, a transmission member connecting said rotors, a dial, a shaft cooperating therewith, a pointer arm
10 fast on said shaft movable over said dial, and means connecting said shaft with said carrier for shifting the latter by movement of said pointer arm.

43. In a phonograph, the combination of
15 a record support with means for rotating said support including a carrier, rotors mounted thereon, a transmission member connecting said rotors, a dial, a shaft, a pointer arm fast on said shaft movable over
20 said dial, means connecting said shaft with said carrier for shifting the latter on movement of said pointer arm, and means cooperating with said dial for indicating the positions of said carrier.

44. In a phonograph, the combination of
25 a record support with means for rotating said support including a carrier, rotors mounted thereon, a transmission member connecting said rotors, means for shifting said carrier to reverse said spools, and means
30 for indicating the positions of said carrier including a dial, an index, a follower for engagement with the wound member on the rotors, and means connecting said follower
35 with said index.

45. In a phonograph, the combination of
40 a record support with means for rotating said support including a carrier, rotors mounted thereon, a transmission member connecting said rotors, means for shifting said carrier to reverse the direction of rotation of said rotors, and means for indicating
45 the positions of said carrier including a dial plate having a pair of holes therein, an index having buttons for registration with said holes, a follower for engagement with the tape wound on the rotors, and means connecting said follower with said index for shifting the latter by the former.

46. In a phonograph, the combination of
50 a record support with a transmission unit for rotating said support at a variable speed appropriate to play one size of record, a transmission unit for rotating said support
55 at a varying speed appropriate to play a different sized record, and means for bodily shifting said units to render either of them effective at will.

47. In a phonograph, the combination of
60 a record support with means for rotating said support including independent transmission units for rotating different sized records, and means for rendering either of said units effective at will.

48. In a phonograph, the combination of
65 a record support with means for rotating said support including different transmission units having provision for imparting accelerated rotation to said record support for playing different sized records, and
70 means for rendering either of said units effective at will.

49. In a phonograph, the combination of
75 a record support with means for rotating said support including transmission units for playing different sized records, means for rendering either of said units effective at will, and means for indicating which of said units is in effective position.

50. In a phonograph, the combination of
80 a record support with means for rotating said support including reversible transmission units for playing different sized records, means for rendering either of said units effective at will, and index means having
85 provision for indicating the positions of said units.

51. In a phonograph, the combination of
90 a record support with means for rotating said support including a transmission unit for imparting a variable speed to said support, an independent transmission unit for imparting a constant speed to said support, and means for rendering either of said units effective at will.

52. In a phonograph, the combination of
95 a record support with means for rotating said support including transmission units for imparting variable speeds to said support, a transmission unit for imparting a constant speed to said support, and means
100 for rendering any of said transmission units effective at will.

53. In a phonograph, the combination of
105 a record support with means for rotating said support including transmission units for imparting variable speeds to said support, a transmission unit for imparting a constant speed to said support, means for rendering any of said transmission units
110 effective at will, and means for indicating which of said units is in effective position.

54. In a phonograph, the combination of
115 a record support with means for rotating said support including a carrier, spools mounted thereon, a transmission tape connecting said spools, a dial, a shaft, means connecting said carrier with said shaft, a pointer arm fast on said shaft for shifting
120 said carrier, and means cooperating with said shaft tending to hold the same in predetermined positions of adjustment.

55. In a phonograph, the combination of
125 a record support with means for rotating said support including a carrier, spools mounted thereon, a transmission tape connecting said spools, a dial, a shaft, means connecting said carrier with said shaft, a

pointer arm fast on said shaft for shifting said carrier, a wheel on said shaft having flat edges, and a spring-pressed plunger for engagement with said edges to tend to hold
5 said shaft in different positions of adjustment.

56. In a phonograph, the combination of a record support with means for rotating said support including driving and driven
10 shafts, rotors, a flexible transmission member connecting and adapted to be wound on said rotors, and a spring-pressed element adapted to press on the portion of said member wound on one of the rotors and
15 having provision for reducing the pressure thereon as said member is unwound from such rotor.

57. In a phonograph, the combination of a record support with driving means for
20 rotating said support, braking means for said driving means, and means for automatically applying said braking means and means for automatically, gradually releasing said braking means in the course of the
25 playing of the record.

58. In a phonograph, the combination of a record support with means for rotating said support including an electric motor, a pair of rotors, a flexible transmission member connecting said rotors, a circuit for said
30 motor, and means controlled by said member for automatically breaking said circuit on the completion of the playing of a record.

59. In a phonograph, the combination of
35 a record support with means for rotating said support including an electric motor, a circuit therefor, a pair of rotors, a flexible transmission member connecting said rotors, and an arm adapted to bear on said member, said circuit including contact means carried by said arm for engagement with said
40 member to complete the circuit and for engagement with one of said rotors to break the circuit.

60. In a phonograph, the combination of a record support with means for rotating said support including an electric motor, a pair of rotors, a conductor transmission member connecting said rotors, and a circuit
50 for said motor including contact means for engagement with said conductor member to complete the circuit to said motor and for engagement with the rotor to break the circuit to said motor.

61. In a phonograph, the combination of a record support with means for rotating said support including a pair of rotors, a flexible transmission member connecting said rotors, a carrier for said rotors having provision
60 for shifting the same to play successive records, an electric motor, and a circuit therefor including contact means controlled by said member and rotors in the different positions of adjustment of said carrier for automatically breaking the circuit to said motor

to arrest the same on the completion of the playing of a record.

62. In a phonograph, the combination of a record support with means for rotating said support including a transmission unit
70 for imparting a variable speed to said support, a transmission unit for imparting a constant speed to said support, an electric motor for driving said support, and a circuit to said motor including means cooperating
75 with said units for controlling said motor.

63. In a phonograph, the combination with a support for a disk record, of means to positively drive said support with a progressively varying speed.
80

64. In a phonograph, the combination with a support for a disk record, of means to positively drive said support with an increasing acceleration.

65. In a phonograph, the combination
85 with a support for a disk record, of mechanism to positively drive said support with a gradually increasing angular acceleration.

66. In a phonograph, the combination with a support for a disk record, of a stylus
90 support movable radially of the record, and mechanism to positively drive said record support having means for compensating for relative speed variation between a stylus and record during said radial movement of the
95 former.

67. In a phonograph, the combination with a support for a disk record, of a stylus support for permitting movement of a stylus
100 radially of the record as the stylus travels from convolution to convolution of the record track, and mechanism for positively rotating said record support at a progressively varying speed to compensate for relative
105 speed variation between said stylus and record as the former travels from convolution to convolution of said track.

68. In a phonograph, the combination with a record support, of driving means
110 positively to rotate said support including a pair of rotors and a flexible member connecting them.

69. In a phonograph, the combination with a record support, of driving means
115 positively to rotate the same including a pair of rotors, a flexible member connecting them, and means to drive said rotors alternately in opposite directions.

70. In a phonograph, the combination with a record support, of driving means
120 positively to rotate the same including a pair of rotors, a flexible member connecting them, a carrier for said rotors, and means to shift said carrier and change the direction of rotation of said rotors.
125

71. In a phonograph, the combination with a record support, of driving means
130 positively to rotate the same including a pair of rotors, a flexible member connecting them, a carrier for said rotors, and means

to adjust said carrier to change the direction of rotation of said rotors, and means to indicate the adjustments of said carrier.

72. In a phonograph, the combination with
5 a record support, of driving means positively to rotate the same including a pair of rotors, a flexible member connecting them, a carrier for said rotors, and means to adjust said carrier to change the direction of
10 rotation of said rotors, means to indicate the adjustments of said carrier, and means automatically to arrest said rotors on completion of sound reproduction from a record.

73. In a phonograph, the combination
15 with a record support of means to rotate said support; a driving rotor and driven rotor; a flexible tape winding on itself on one of said rotors and unwinding on the other of said rotors from a coil built up on itself;
20 and a driving connection between one of said rotors and the record support, whereby a gradually increasing angular acceleration is imparted to said record support.

74. In a phonograph, the combination with
25 a record support of means to rotate said support; a driving rotor driven at fixed speed; a flexible transmission member winding on itself on said driving rotor, an unwinding rotor from which said flexible transmission
30 member is unwound from a coil built up on itself; and a driving connection between the unwinding rotor and the record support, whereby a gradually increasing angular acceleration is imparted to said record
35 support.

75. In a phonograph, the combination with driving and driven shafts of transmission means connecting them including gears on said shafts, a carrier, rotative elements on
40 said carrier, a flexible member connecting said elements, gears for said elements, pinions on said carrier meshing with the gear of one of said elements, and means to adjust said carrier to shift said pinions into and
45 out of engagement with the gears on said driving and driven shafts.

76. In a phonograph, the combination with driving and driven shafts of gears thereon, and transmission means connecting said
50 gears including a carrier, rotative elements mounted thereon, a flexible member connecting said elements, gears for said elements, pinions meshing with the gear for one of said elements, and means to move said carrier to shift the gear for one of said elements
55 and the pinions for the gear of the other element into and out of engagement with the gears on said driving and driven shaft.

77. In a phonograph, the combination with
60 driving and driven shafts of a carrier, rotative elements mounted thereon, a flexible member adapted to be wound to and from

said elements, and means on said carrier adjacent said elements to limit outward movement of the coils of said member.

78. In a phonograph, the combination with driving and driven shafts of transmission means therefor including a carrier, rotative elements mounted thereon, a member adapted to be wound to and from said elements,
70 means to shift said carrier to change the direction of rotation of said elements, and means to engage said elements and prevent rotation thereof while said carrier is shifted.

79. In a phonograph, the combination with
75 driving and driven shafts of transmission means therefor including a carrier, spools thereon, a flexible member adapted to be wound to and from said spools, and means actuated by the accumulated coils of said
80 member on one of said spools to engage and arrest both of said spools.

80. In a phonograph, the combination with driving and driven shafts of transmission means therefor including a carrier, spools
85 mounted thereon, a flexible member adapted to be wound to and from said spools, and means actuated by the accumulated coils of materials on either of said spools for engaging and arresting both of said spools.

81. In a phonograph, the combination with driving and driven shafts of transmission means therefor including a carrier, spools
90 mounted thereon, a flexible member adapted to be wound to and from said spools, and
95 means to engage both of said spools to arrest the same and hold said member taut.

82. In a phonograph, the combination with a motor driven shaft of a table, a shaft therefor, and transmission means connecting
100 said shafts including a carrier, rotative elements thereon, a flexible member adapted to be wound to and from said elements, an index, and a follower directly connected thereto and operated by engagement there-
105 of with coils of tape wound on said rotative elements.

83. In a phonograph, the combination with a motor driven shaft of a table, a shaft therefor, and transmission means connecting
110 said shafts including a carrier, rotative elements thereon, a flexible member adapted to be wound to and from said elements, and means for adjusting said carrier to play successive records including a follower, index means, and means directly connecting
115 said follower with said index means.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

STANLEY R. MacLANE.

Witnesses:

ROBERT H. KAMMLER,
HENRY T. WILLIAMS.

DRIVING AND SPEED REGULATING
MECHANISM FOR PHONOGRAPHS,

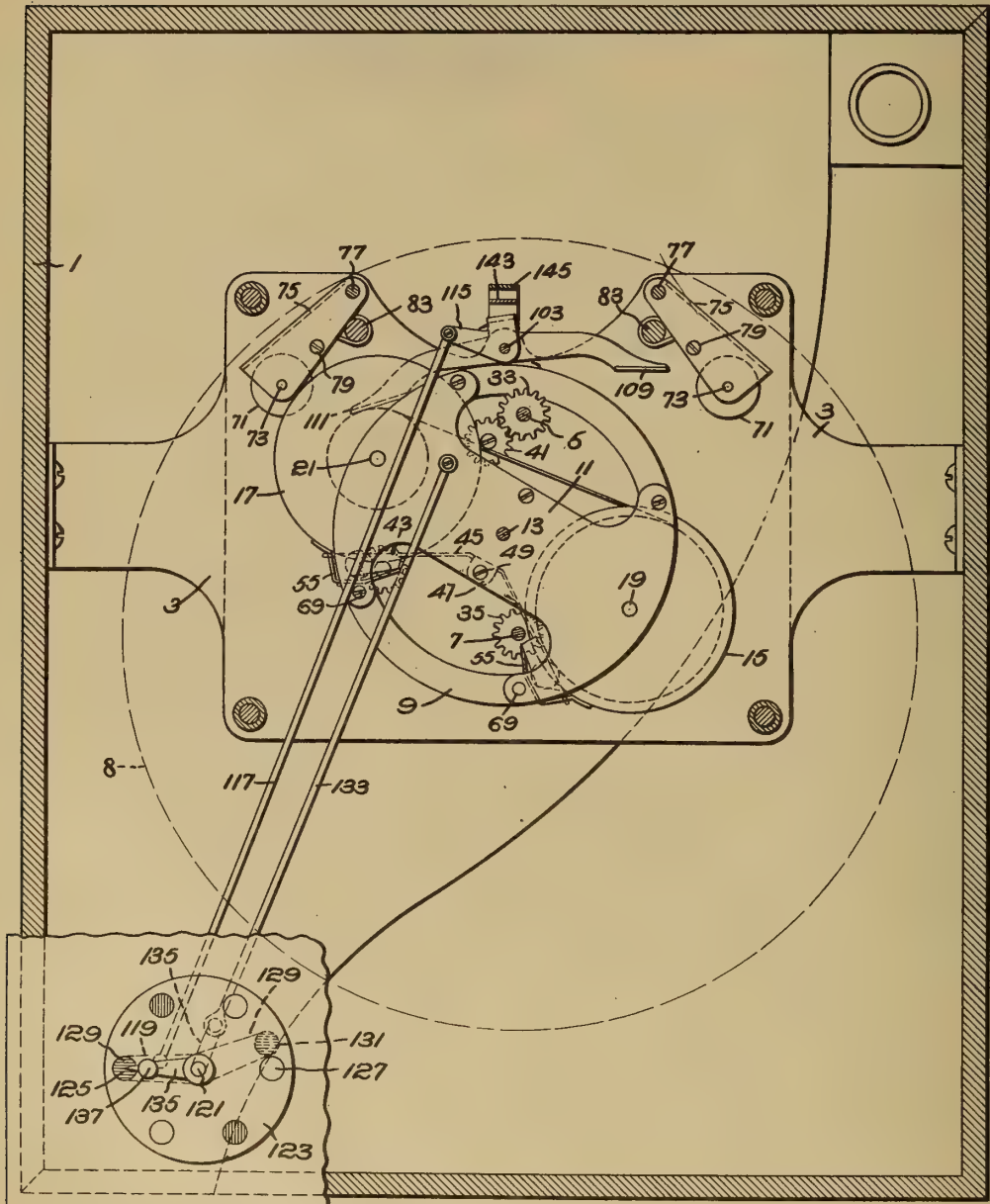
#1,221,075-----S.R. MacLane,
Patented-April 3rd, 1917.
Filed-July 7th, 1916.

S. R. MacLANE.
 DRIVING AND SPEED REGULATING MECHANISM FOR PHONOGRAPHS.
 APPLICATION FILED JULY 7, 1916.

1,221,075.

Patented Apr. 3, 1917.
 2 SHEETS—SHEET 1.

Fig. 1.



Inventor:
 Stanley R. MacLane,
 by Emory Booth, Janney & Vanuxem,
 Attys.

S. R. MacLANE.
 DRIVING AND SPEED REGULATING MECHANISM FOR PHONOGRAPHS.
 APPLICATION FILED JULY 7, 1916.

1,221,075.

Patented Apr. 3, 1917.

2 SHEETS—SHEET 2.

Fig. 2.

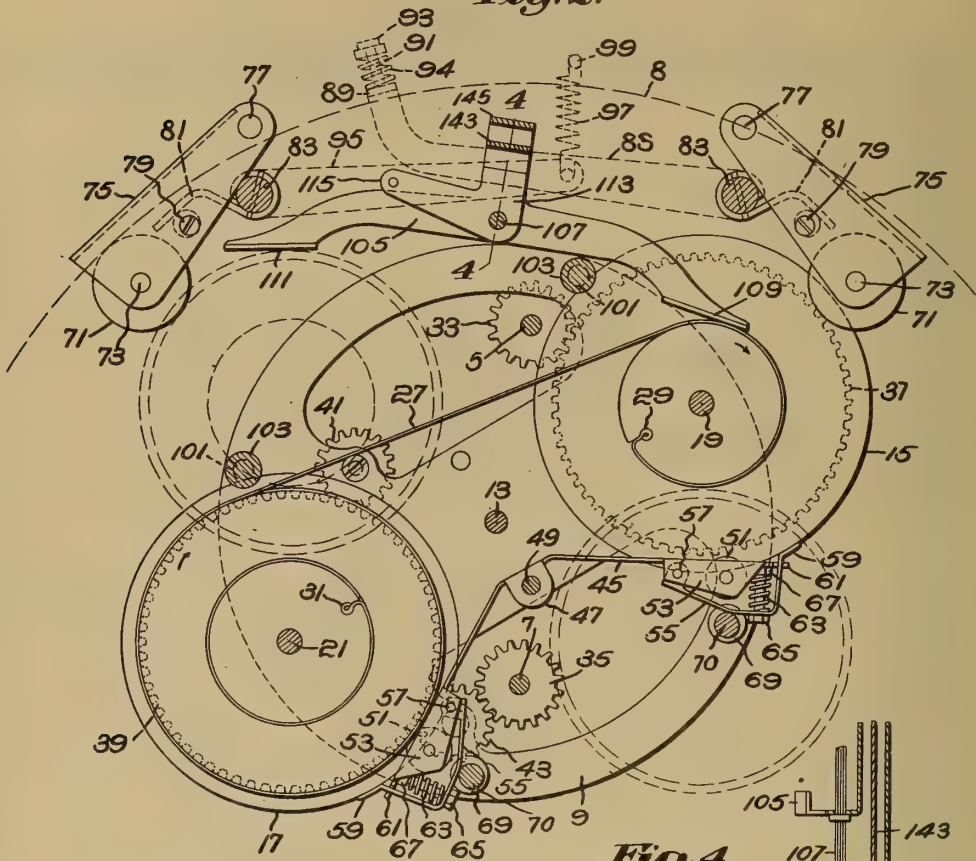


Fig. 4.

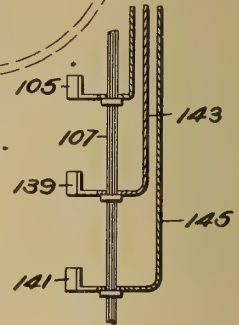
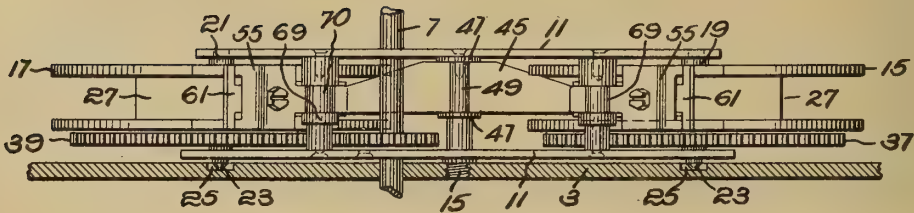


Fig. 3.



Inventor:
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 by Emory, Roth, Jamney & Vaneys
 Attys.

UNITED STATES PATENT OFFICE.

STANLEY R. MACLANE, OF BOSTON, MASSACHUSETTS.

DRIVING AND SPEED-REGULATING MECHANISM FOR PHONOGRAPHS.

1,221,075.

Specification of Letters Patent. Patented Apr. 3, 1917.

Application filed July 7, 1916. Serial No. 108,064.

To all whom it may concern:

Be it known that I, STANLEY R. MACLANE, a citizen of the United States, and a resident of Boston, county of Suffolk, and Commonwealth of Massachusetts, have invented an Improvement in Driving and Speed-Regulating Mechanisms for Phonographs, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to improvements in the phonograph shown in my copending application Serial No. 48,727 filed September 2, 1915.

Among other objects the invention provides improved means for driving the record supporting table with a substantially uniform speed between the stylus and record throughout the reproduction of the composition thereon; means coöperating with the driving means and table to automatically arrest the latter on completion of the composition; and simple and effective means to indicate and control adjustment of the driving means for playing successive records.

The character of the invention may be best understood by reference to the following description of an embodiment thereof illustrating the invention shown in the accompanying drawings, wherein,—

Figure 1 is a horizontal section through a phonograph casing showing in plan portions of the driving and controlling mechanism for the table;

Fig. 2 on an enlarged scale is a plan view of certain parts shown in Fig. 1;

Fig. 3 is a view partially in vertical section and partially in side elevation of parts shown in Fig. 2; and

Fig. 4 is a vertical section taken on line 4—4 of Fig. 2.

Referring to the drawings, the illustrative machine shown therein as embodying the invention comprises a casing 1 in which is mounted a base plate 3 having a shaft 5 projecting upwardly therethrough and adapted to be driven by any suitable motor (not shown). 7 designates a vertical shaft also projecting upward through said plate and above the casing to receive the usual

turntable 8 (shown in broken lines) for supporting the record. Since the construction thus far described may be similar to that disclosed in my said application it is unnecessary further to show and describe the same in detail herein.

To drive the table shaft from the motor shaft at a varying speed for the purpose described, there is provided a carrier 9 comprising upper and lower circular plates 11 having apertures to allow the driving and driven shafts to project therethrough. These plates are connected and fulcrumed on a post 13 mounted on the base plate 3 referred to, substantially midway between said shafts. Spools 15 and 17 are mounted fast on shafts 19 and 21 journaled in bearings in said plates 11. These shafts project through the lower plates and present conical ends 23 (Fig. 3) adapted to slide in grooves 25 in said base plate to contribute to the support of the spools as the carrier is adjusted to initiate the playing of successive records, as more fully hereinafter described. The groove 25 may be kept full of oil, the lower circular plate 11 serving as a cover for the groove.

The spools are connected by a flexible transmission member conveniently in the form of a thin tape 27 of copper or other suitable material. One end of this tape is anchored to the spool 15 at 29 and the opposite end of said tape is anchored to the spool 17 at 31. The tape is adapted to be wound to and from the spools, and to reduce flexion and consequent weakening of the tape as much as possible, it is extended between the spools at one side of the plane of their axes instead of crossing said plane as in my said copending application.

To rotate the spools a pinion 33 is mounted fast on the driving shaft and a pinion 35 is mounted fast on the driven shaft. A gear 37 fast on the shaft for spool 15 is adapted to engage either said driving or said driven pinion according to the position to which the carrier is shifted.

A gear 39 is mounted fast on the shaft for spool 17 and meshes with idler pinions 41 and 43 journaled on stud shafts on the carrier. The pinion 41 is adapted to engage the driving pinion 33 when the carrier

is shifted to one position and the pinion 43 is adapted to engage the driven pinion 35 when the carrier is shifted to its other position. The provision of the idler pinions 5 enables the spools to be rotated in the same direction, permits the tape to be stretched between the spools on the same side of the plane of their axes, and prevents flexing the belt in opposite directions and consequent 10 weakening thereof.

It will be noted the table driving shaft 35 is rotated in the same direction whether driven by the gear of the spool 15 or by the gear and a pinion of the spool 17. 15 Thus the spool and tape transmission is always in readiness to play consecutive records without the necessity of a preliminary rewinding of the tape.

An important feature of the invention 20 relates to means to prevent the tape from uncoiling and rotating the spools when they are not active in driving the table; to hold the tape taut in readiness for rewinding; and to prevent the spools from rotating while the carrier is shifted after the 25 playing of one record to commence the playing of the next record. This means comprises a lever 45 having lugs 47 intermediate the ends thereof, bent therefrom and fulcrumed on the upper reduced end of a post 49 on the carrier. Adjacent the 30 outer ends of the lever are rollers 51 for engagement with the tape coils when a sufficient number have accumulated on the spools. These rollers are journaled on pins 35 in opposed ears 53 bent from and conveniently integral with said lever. Short arms 55 have ends fulcrumed on pins 57 connecting said ears and extend outwardly toward 40 the ends of said lever where they are enlarged and bent thence inward to present brake shoes or feet 59 for engagement with the heads of the spools. These feet may straddle and be guided by T-extensions 61 45 on said lever. Helical springs 63 tend to press the feet 59 outward away from the spools until limited by the heads of screw bolts 65, entered through said arms, tapped in said lever, and held in different positions 50 of adjustment by lock nuts 67.

The arms 55 are adapted to engage stops conveniently in the form of posts 69 fixed on the carrier. These posts may have eccentric portions 70 which, on rotative adjustment thereof, will cause the same to stop 55 the arm in different positions as desired.

To facilitate understanding of the operation of the brake device described, it may be assumed the carrier is in the position shown 60 in Fig. 2 with the gear of the spool 15 in mesh with the motor driven pinion 33, and the pinion 43 of the spool 17 in mesh with the table driving pinion 35. The motor driven pinion will rotate the spool 15 in a 65 clockwise direction and wind the tape 27

thereon. This will unwind the tape from the spool 17 and rotate the latter also in a clockwise direction. The rotation of the spool 17 will rotate its gear 39, and the latter through the idler pinion 43 will rotate 70 the table driving shaft 35 in a clockwise direction.

At the commencement of the winding of the tape on the spool 15 the latter will be acting through a short radius, and as the 75 coils of tape accumulate on said spool, the effective driving radius thereof will progressively increase while the effective driven radius of the spool 17 will progressively decrease. This change in the ratio 80 of the radii will impart a continuously varying acceleration to the record table and compensate for the reduction in the relative speed between the stylus and record as the former moves radially inward from the 85 outer margin toward the center of the record.

When a sufficient number of coils of tape have accumulated on the spool 15 the tape will engage the roller 51 adjacent thereto 90 and thereby rock the brake lever in a clockwise direction (Fig. 2). This will cause the screw bolt 65 at the opposite end of the lever to press the feet 59 against the peripheries of the heads of the spool 17 and prevent 95 further rotation of said spool.

In the course of the clockwise rocking of the lever, the arm 55 adjacent the spool 15 will be brought into engagement with the stop post 69 adjacent thereto, thereby rock- 100 ing said arm in a counterclockwise direction and pressing its feet against said spool to arrest the same. Thus both spools will be securely held against rotation for the purposes referred to. 105

When the carrier is shifted to bring the spools into position for rotation in an opposite direction, the coils of tape will accumulate on the spool 17 and act on the roller 51 adjacent thereto and press the feet against 110 the spools to arrest the same in a manner similar to that described.

At the commencement of the clockwise rotation of the spool 15 to unwind the tape from the spool 17, the pressure of the tape 115 against the brake roller 51 adjacent the spool 17 will be immediately reduced, thereby releasing the brake without undue opposition to the starting of the rotation of said spools.

As soon as the brake is released the springs 120 63 urge their feet away from the spools and prevent them from impeding the rotation thereof during the playing of a record. The spring-pressed arms 55 co-act with the stop posts 69 to hold the brake lever in a neutral 125 position throughout the playing of a record.

Next will be described means coöperating with the spools and the record table for automatically stopping the latter on the completion of the playing of a record. To ac- 130

comply with this there are provided rollers 71 journaled on pins 73 on carriers 75 fulcrumed on pins 77 on the base plate 3 referred to. Cam shafts 79 are mounted on these carriers intermediate said rollers and pins 77, and are adapted to engage the free ends of spring arms 81 fast on shafts 83 projecting through said plate. One of these shafts has a lever 85 fast thereon projecting outward and thence upward to a point beyond the periphery of the record supporting table 88 (indicated by broken lines in Fig. 2). At the end of this lever is a shoe 89 having a leather face to engage the periphery of the table, said shoe being carried by a stud 91 tapped into the upturned end of said lever and held by an adjusting nut 93. The shoe is urged inward toward the table by a helical spring 94 encircling said stud. The other shaft 83 referred to, is connected to the lever 85 by a lever 95. A helical spring 97 connected to said levers and to a fixed pin 99, tends to shift the shoe 89 away from the table.

When the carrier is in its position shown in Fig. 2, the spool 15 will be adjacent one of the rollers 71, and as the coils of tape accumulate on said spool they will cause the tape to approach and finally engage and press said roller outward. This will rock the carrier for said roller in a contraclockwise direction and cause its eccentric shaft 79 to press on the spring arm 81 and rock the lever 85 also in a contraclockwise direction. This will draw the shoe 89 inward against the periphery of the table and arrest the latter. The tension on the spring arm 81 will increase as the roller 71 is moved outward from the spool and increase the pressure of the shoe 89 against the table. The eccentric shaft 79 and the nut 93 may be adjusted to vary the tension of the springs 81 and 94 as required.

When the carrier is shifted to bring the spool 17 adjacent the other roller 71, it will rock its carrier in a clockwise direction and the lever 95 in a similar direction, and again press the shoe 89 against the table to arrest the same in a manner similar to that just described.

The stop will continue to hold the table stationary until the carrier is shifted to move one or the other of the spools 15 and 17 away from the rollers 71 to commence the playing of the next record. This adjustment of the carrier will render the spring 97 effective to shift the shoe 89 away from the table.

The brakes for the spools should be adjusted to delay arrest of the latter until after the coils of tape have accumulated thereon sufficiently to stop the table.

To contribute to the retention of the tape on the spools, post 101 may be provided on the carrier adjacent the spools opposite the

brakes referred to. Rollers 103 on these posts may project between the heads of the spools and thereby prevent the tape from springing outward beyond the peripheries of said heads.

To indicate the two positions of the carrier for the spools, a follower 105 may be provided fulcrumed intermediate its ends on a shaft 107 projecting through the base plate. This follower has an end 109 for engagement with the tape wound on the spool 15 and an end 111 for engagement with the tape wound on the spool 17. An arm 113 is curved upward from said follower and thence over the same and apertured to receive the shaft 107. An arm 115 projecting therefrom is connected by a rod 117 (Fig. 1) with an arm 119 of an index lever loosely pivoted on a crank shaft 121, the upper end of which is journaled in a dial plate 123 set in an aperture in the top of the casing. This dial plate has a pair of holes 125 and 127 therein and the index lever has an arm 129 offset somewhat from the line of the arm 119 of said lever. A button 129 on the arm 119 is adapted to register with the hole 125, and a button 131 on the arm 129 is adapted to register with the hole 127.

The lever including the arms 119 and 129 is adapted to be rocked in the course of the accumulation of the coils on the spools to shift said buttons alternately into registration with their holes, thereby indicating the adjustment necessary to shift the spool carrier to play the next record. To rock the carrier it is directly connected by a rod 133 with a crank 135 fast on the shaft 121 referred to. An index arm 135 is mounted fast on said shaft above the dial plate and provided with a handle 137.

Referring to Fig. 1, it will be observed the carrier is adjusted to a position in which the spool 17 is driven by the motor driven pinion, and through the transmission tape is rotating the spool 17 to drive the table-actuating pinion. The follower end 111 is engaging the tape on the spool 17. As the coils of tape accumulate on said spool, the follower will be rocked in a clockwise direction, (Fig. 1), and acting through the rod 117 will gradually shift the button 129 out of registration with its hole 125 and bring the button 131 into registration with its hole 127. This indicates that in order to play the next record the index arm should be turned until it points to the button 131. This will rotate the shaft 121 and through the rod 133 will rock the carrier from its position shown in Fig. 1 to its position shown in Fig. 2.

As stated, as soon as the carrier is shifted it will release the table stop, and hence the index arm will serve to shift the carrier and start the rotation of the table to play the record.

The carrier, spools and gears interposed

between the motor driven shaft and the table driving shaft, constitute a transmission unit appropriate for rotating the table to play a record of a predetermined size. In order that the machine may have the capacity for playing records of other sizes, similar suitable transmission units may be provided according to the number to be used. These units may be arranged in superposed relation as shown in my said application. Since these additional units may be similar to the unit described it is unnecessary to show them herein.

Each of these units would be provided with a carrier and a follower adapted to be connected to the index control as in the case of the unit described herein. The followers for the several superposed units may all be fulcrumed on the same shaft 107 in nested arrangement to provide a compact assembly as shown in Figs. 2 and 4. Three such followers are shown herein including a follower 139 directly beneath the follower 105 and a follower 141 directly beneath the follower 139. The follower 139 has an arm 143 projecting upward parallel to the shaft 107 and bent inward to overlie the arm 113 of the follower 105. The follower 141 has an arm 145 extending upward parallel to the shaft 107 and bent inward to overlie the arm 143 of the follower 139. By this construction and arrangement, the followers occupy a minimum space and may be directly connected to the index arm without obstructing or interfering with the operation of the other parts of the mechanism.

Having described one illustrative embodiment of the invention without limiting the same thereto, what I claim as new and desire to secure by Letters Patent is:

1. In a phonograph, the combination with a motor driven shaft of a table driving shaft, and transmission means connecting them including a carrier, spools thereon, and a flexible tape extending between said spools at the same side of their axes.

2. In a phonograph, the combination with a motor driven shaft of a table driving shaft, and transmission means connecting them including a carrier, rotative elements thereon, and a flexible transmission member connecting said elements adapted to be wound to and from said elements on the same side of their axes.

3. In a phonograph, the combination with driving and driven shafts of transmission means connecting the same including a carrier, rotative elements mounted thereon, and a flexible member connecting said elements for driving one from and in the same direction as the other.

4. In a phonograph, the combination with driving and driven shafts of transmission means connecting them including a carrier, spools mounted thereon, a flexible transmis-

sion member connecting said spools, and means on said carrier projecting between the heads of said spools to limit outward movement of the coils of said member wound thereon.

5. In a phonograph, the combination with driving and driven shafts of transmission means therefor including a carrier comprising spaced plates, shafts journaled in bearings therein, spools on said shafts, and a flexible transmission member connecting said spools and adapted to be wound to and from the same.

6. In a phonograph, the combination with driving and driven shafts of transmission means therefor including a carrier, rotative elements mounted thereon, a flexible transmission member adapted to be wound to and from said elements, a plate having grooves therein, and shafts for said elements projecting from said carrier into said grooves.

7. In a phonograph, the combination with driving and driven shafts of transmission means therefor including a carrier, rotative elements mounted thereon, a flexible transmission member connecting and adapted to be wound to and from said elements, a support, and shafts for said elements having end thrust engagement with said support.

8. In a phonograph, the combination with driving and driven gears of a support, a carrier mounted on said support, rotative elements on said carrier, a flexible member for rotating either of said elements from the other, shafts for said elements having ends for engagement with said support, and means to shift said carrier and slide said shafts along said support to change the direction of rotation of said elements.

9. In a phonograph, the combination with driving and driven shafts of transmission means therefor including a carrier, spools mounted thereon, a flexible member adapted to be wound to and from said spools, and means adapted to engage the material wound on either of said spools after a predetermined amount has been wound thereon and having provision for engaging and arresting both of said spools.

10. In a phonograph, the combination with driving and driven elements of transmission means therefor including a carrier, rotative elements thereon, a flexible transmission member adapted to be wound to and from said elements, and a brake for said elements comprising a lever fulcrumed on said carrier, rollers adjacent the ends of said lever for engagement with the material wound on the spools, arms pivoted on said lever having feet to engage said elements, spring means tending to rock said arms away from said elements, means on said lever to limit movement of said arms by said springs, and stops on said carrier to engage said arms and press their feet against said elements.

11. In a phonograph, the combination with driving and driven elements of transmission means therefor including a carrier, rotative elements thereon, a flexible transmission member adapted to be wound to and from said elements, and a brake for said elements comprising a lever fulcrumed on said carrier having rollers adjacent the ends thereof for engagement with the accumulated material on said elements, spring-pressed arms on said lever, and stops on said carrier for pressing said arms against said elements.

12. In a phonograph, the combination with driving and driven elements of transmission means therefor including a carrier, rotative elements thereon, a flexible transmission member adapted to be wound to and from said elements, and brake means for said elements comprising a lever fulcrumed on said carrier, a shoe on said lever for engagement with one of said elements, a roller on said lever for engagement with the accumulated material on the other element, and a shoe adjacent said roller for engagement with the element adjacent said roller.

13. In a phonograph, the combination with driving and driven elements of transmission means therefor including a carrier, rotative elements thereon, a flexible transmission member adapted to be wound to and from said elements, and brake means fulcrumed on said carrier having means pressed outward by the accumulated material on one of said elements, and means automatically pressed inward thereby to engage said element.

14. In a phonograph, the combination with driving and driven elements of transmission means therefor including a carrier, rotative elements thereon, a flexible transmission member adapted to be wound to and from said elements, and brake means for said elements including a lever fulcrumed on said carrier, brake shoes, and means actuated by the accumulated material on one of said elements to apply said shoes to both of said elements.

15. In a phonograph, the combination with driving and driven elements of transmission means therefor including a carrier, rotative elements thereon, a flexible transmission member adapted to be wound to and from said elements, and brake means for said elements comprising a lever fulcrumed on said carrier, brake shoes, and means operated by accumulated material on one of said elements to shift said lever and apply both of said shoes to said elements.

16. In a phonograph, the combination with driving and driven elements of transmission means therefor including a carrier, rotative elements thereon, a flexible transmission member adapted to be wound to and from said elements, and brake means for

said elements comprising a lever fulcrumed on said carrier, brake shoes, stops on said carrier, and means coöperating with one of said stops and the accumulated material on one of said elements to apply one of said shoes to one of said elements and shift said lever to apply the other shoe to the other element.

17. In a phonograph, the combination with driving and driven elements of transmission means therefor including a carrier, rotative elements thereon, a flexible transmission member adapted to be wound to and from said elements, and brake means for said elements comprising a lever fulcrumed on said carrier, brake shoes on said lever, stops on said carrier, and means on said lever coöperating with accumulated material on said elements to shift said shoes against said stops and to apply said shoes to said elements, said stops being adjustable to vary the operation of said shoes.

18. In a phonograph, the combination with a motor driven shaft of a table, a shaft therefor, and transmission means connecting said shafts including a carrier, rotative elements thereon, a flexible member adapted to be wound to and from said elements, and means coöperating with said table and the accumulated material on said elements for automatically arresting said table.

19. In a phonograph, the combination with a motor driven shaft of a table, a shaft therefor, and transmission means connecting said shafts including a carrier, rotative elements thereon, a flexible member adapted to be wound to and from said elements, and means to arrest said table comprising a shaft, a lever fast thereon having a spring-pressed shoe for engaging said table, an arm having a roller to engage the accumulated material on one of said elements, and a spring member to transmit movement from said arm to said lever shaft.

20. In a phonograph, the combination with a motor driven shaft of a table, a shaft therefor, and transmission means connecting said shafts including a carrier, rotative elements thereon, a flexible member adapted to be wound to and from said elements, and means automatically to arrest said table comprising a shaft, a lever fast thereon having a shoe to engage said table, an arm having a roller to engage the accumulated material on one of said elements, a spring member fast on said shaft, and an eccentric shaft on said arm adjustable to variably transmit movement from said arm to said lever shaft.

21. In a phonograph, the combination with a motor driven shaft of a table, a shaft therefor, and transmission means connecting said shafts including a carrier, rotative elements thereon, a flexible member adapted to be wound to and from said elements, and means automatically to arrest said table in-

cluding means operated by the accumulated material on one of said elements adapted to press against said table.

22. In a phonograph, the combination with
5 a motor driven shaft of a table, a shaft therefor, and transmission means connecting said shafts including a carrier, rotative elements thereon, a flexible member adapted to be wound to and from said elements, and
10 means operated by the accumulated material on one of said elements adapted to engage and arrest said table.

23. In a phonograph, the combination with
15 a motor driven shaft of a table, a shaft therefor, and transmission means connecting said shafts including a carrier, rotative elements thereon, a flexible member adapted to be wound to and from said elements, and means operated by the accumulated material
20 on either of said elements to engage and arrest said table.

24. In a phonograph, the combination with
25 a motor driven shaft of a table, a shaft therefor, and transmission means connecting said shafts including a carrier, rotative elements thereon, a flexible member adapted to be wound to and from said elements, and means including a yielding member operated
30 by the accumulated material on either of said elements to arrest said table.

25. In a phonograph, the combination with
35 a motor driven shaft of a table, a shaft therefor, and transmission means connecting said shafts including a carrier, rotative elements thereon, a flexible member adapted to be wound to and from said elements, and means to adjust said carrier to play successive records including a shaft, cranks thereon, an index member for rotating said shaft,
40 a follower actuated by tape accumulated on said spools, a rod directly connecting said

follower with said index member, and a rod directly connecting said carrier with one of said cranks.

26. In a phonograph, the combination with
45 a motor driven shaft of a table, a shaft therefor, and transmission means connecting said shafts including a carrier, rotative elements thereon, a flexible member adapted to be wound to and from said elements, a shaft,
50 a follower fulcrumed on said shaft for engagement with the member wound on said elements, followers for similar elements fulcrumed on said shaft in nested arrangement, and index means responsive to said follow-
55 ers for controlling the shifting of the carrier to play successive records.

27. In a phonograph, the combination with
60 a motor driven shaft 5 of a table 87, a shaft 7 therefor, and transmission means connecting said shafts including a carrier 9, rotative elements 15, 17 thereon, a flexible member 27 adapted to be wound to and from said elements, and means automatically to arrest
65 said table including elements 71 for engagement with the coils of said member on said spools, a lever 85, and a member 89 on said lever to engage said table.

28. In a phonograph, the combination with
70 a motor driven shaft 5 of a table driving shaft 7, and transmission means connecting said shafts including a carrier 9, rotative elements 15, 17 thereon, a flexible member 27 adapted to be wound to and from said elements, and brake means for said elements
75 including a lever 45, brake shoes 59, and means 69 to press said shoes against said elements.

In testimony whereof, I have signed my name to this specification.

STANLEY R. MACLANE.

BRAKE FOR TALKING MACHINES,
#1,221,285-----G.Buelna & A.E.Burson,
Patented-April 3rd, 1917.
Filed-January 30th, 1911.

G. BUELNA & A. E. BURSON.
 BRAKE FOR TALKING MACHINES.
 APPLICATION FILED JAN. 30, 1911.

1,221,285.

Patented Apr. 3, 1917.
 2 SHEETS—SHEET 1.

Fig. 1.

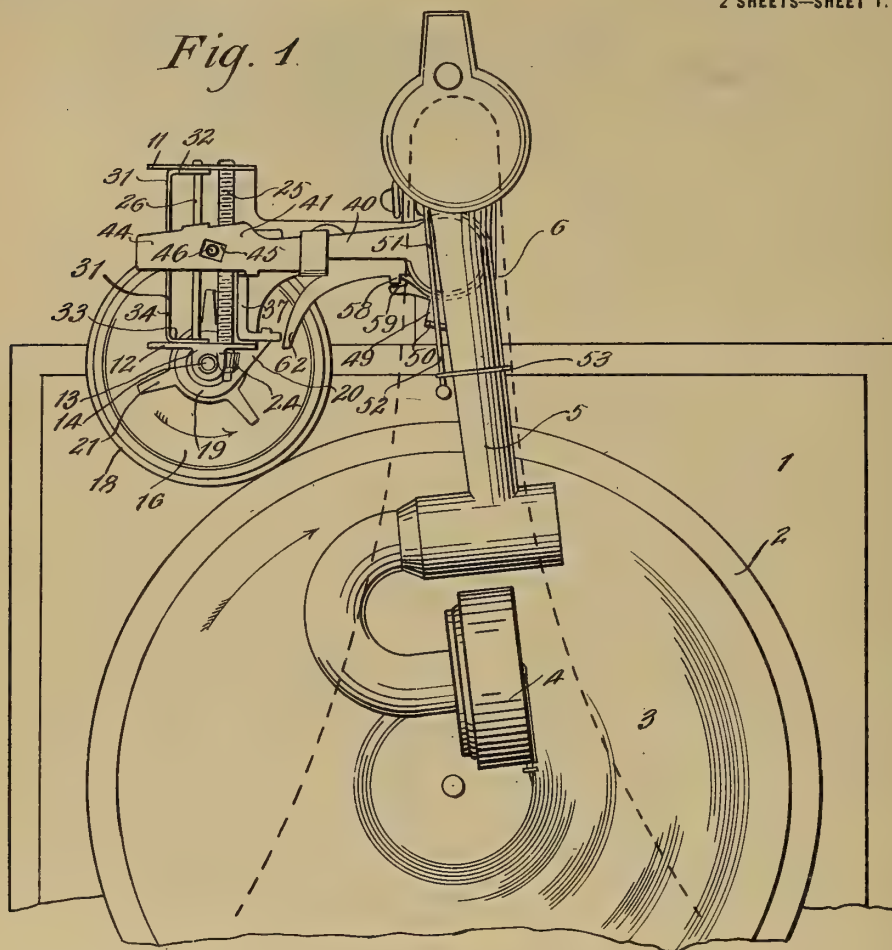
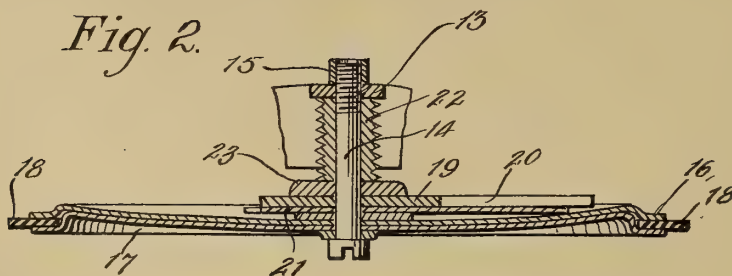


Fig. 2.



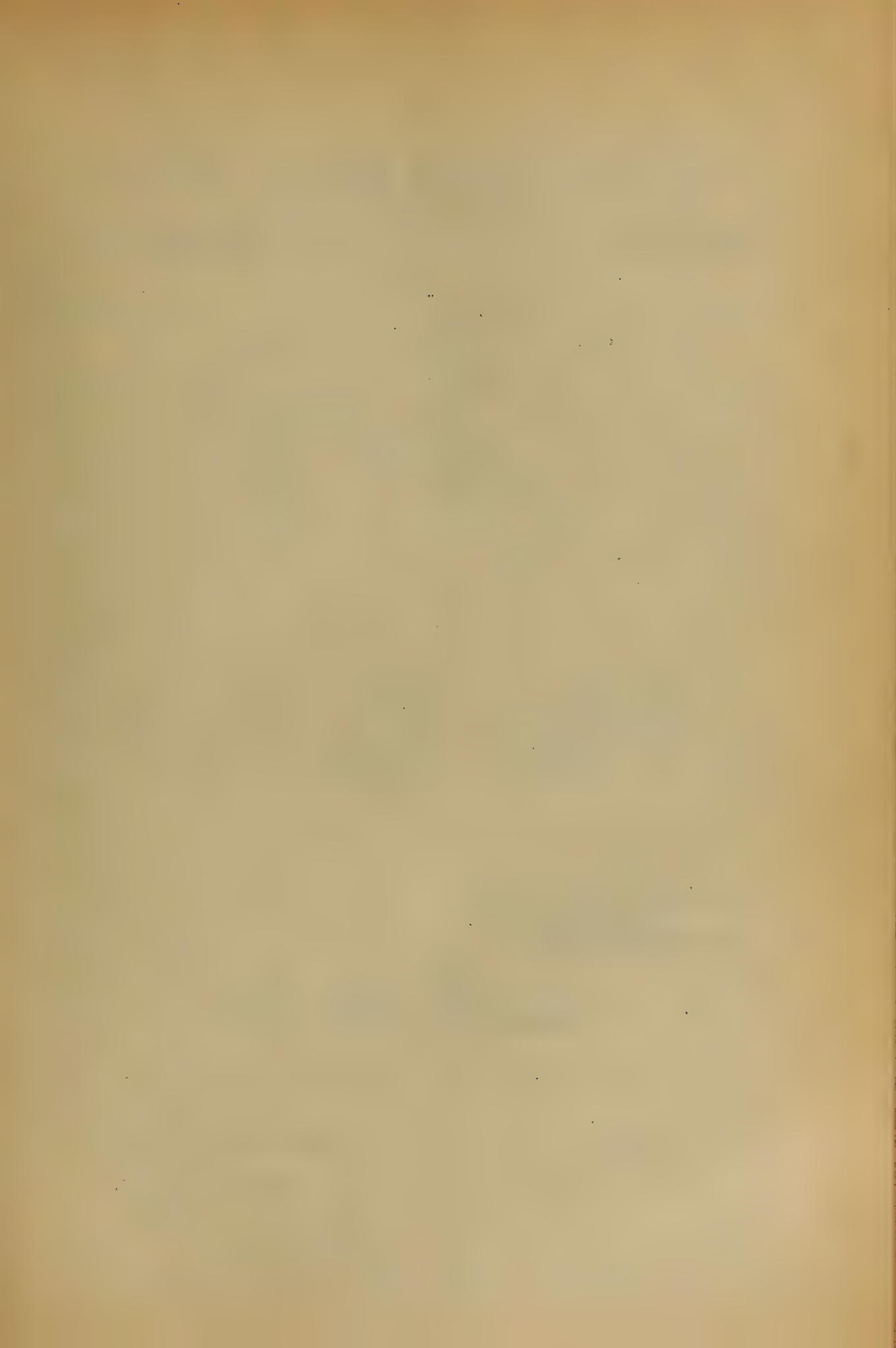
Witnesses

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BRAKE FOR TALKING MACHINES.
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1,221,285.

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2 SHEETS—SHEET 2.

Fig. 3

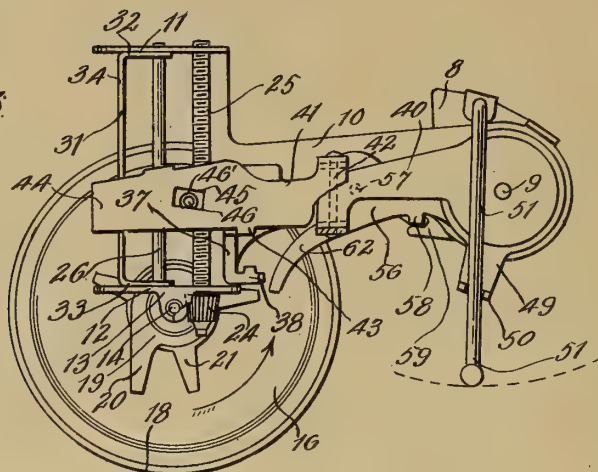


Fig. 4

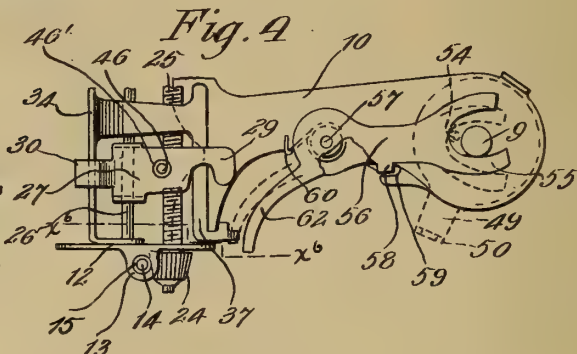


Fig. 5

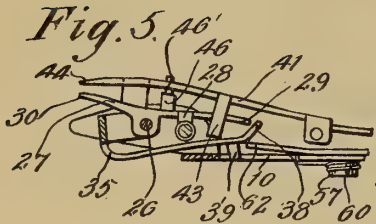


Fig. 6

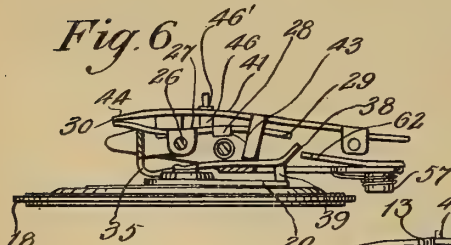
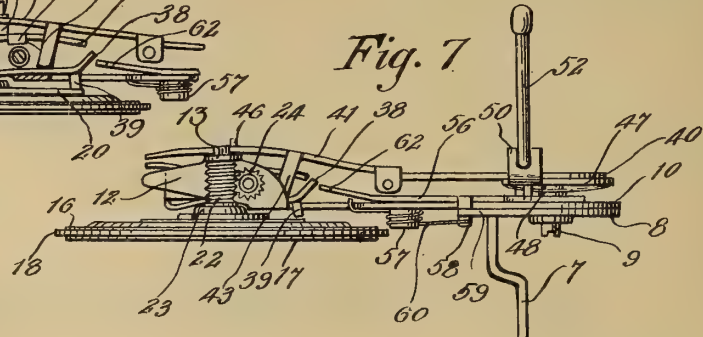


Fig. 7



Witnesses

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UNITED STATES PATENT OFFICE.

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BRAKE FOR TALKING-MACHINES.

1,221,285.

Specification of Letters Patent.

Patented Apr. 3, 1917.

Application filed January 30, 1911. Serial No. 606,965.

To all whom it may concern:

Be it known that we, GUADALUPE BUELNA and ARTHUR E. BURSON, citizens of the United States, residing at Santa Barbara, in the county of Santa Barbara and State of California, have invented a certain new and useful Brake for Talking-Machines, of which the following is a specification.

This invention relates to automatic stop mechanism, and more particularly to an automatic stop mechanism especially designed for a talking machine, which ordinarily has a rotating record support or member and a reproducing member, as a sound-box and tone-arm, said record member and reproducing member being relatively movable, the latter being commonly fed relatively to the former by the coaction of the sound-box with the record groove.

Heretofore automatic stop mechanisms for talking machines have been devised which necessitated the manual manipulation of some adjustable element, in order that the stop mechanism might become operative at a desired and predetermined point in the operation of the machine, as at the completion of the reproduction of the sound-record. Such manual manipulation of the adjustable element became necessary with each different record reproduced, because of the fact that different records terminate at different distances from the centers of the tablets. It is an object of this invention to entirely do away with the necessity of any manual manipulation of parts of the mechanism, in order that the machine shall stop at the desired time.

Another type of automatic stop mechanism for talking machines has been devised wherein the stopping of the machine depends upon certain elements of such mechanism passing through a predetermined cycle of operation, subsequent to the arrival by the machine at the point where it is desired that stopping shall occur.

It is a further object of this invention to provide a stop mechanism that shall become operative immediately upon such desired point being reached, as at the completion of the reproduction of the sound-record, without the delay incident to elements passing through a prior cycle of operations.

A further object of this invention is to provide an automatic stop mechanism for talking machines wherein such mechanism is controlled by the relative movement of the sound-record member and the sound-reproducing member, is the tone-arm. In the preferred embodiment to be described the actuation of the stop mechanism is determined by the cessation of movement of the sound-reproducing member transversely of the record member. It is, however, an object of this invention to provide a stop mechanism that shall obtain such actuation of the stop mechanism upon a material variation in the speed of travel of the relatively movable member such, for example, as a material decrease in its speed of movement.

A further object of this invention is to provide an automatic brake for talking machines that shall require no manual manipulation of parts, in order that the machine shall stop at the desired time; that shall operate immediately at the desired point in the operation of the machine without waiting upon a prior cycle of operations; and that shall be controlled by the relative movement of the sound-record member and the sound-reproducing member, being actuated by the cessation of movement of the relatively movable member; or by a material variation in its speed of movement.

A still further object of this invention is to provide a start-and-stop mechanism which shall be automatically actuated to start the rotation of the sound-record tablet, upon movement of the sound-reproducing member to a position adjacent the beginning of the record.

Stated somewhat generally, the invention consists in providing a rotary record support or member having a record tablet thereon, which together constitute a rotating member, and a reproducing member comprising a tone-arm and sound-box, which are normally propelled across the record by the coaction of the sound-box and record groove, and which together constitute a traveling member, in combination with a stop mechanism which is automatically controlled by the movement of said reproducing member. This stop mechanism comprises an element moved by the motor of the machine, herein

shown as a reciprocating device fed by a threaded device that is in turn driven from the record member, and an element moved by the sound-reproducing member, herein shown as an arm swung by the movement of such member, these elements being so constructed and related that, during the advance of the reproducing member across the record member, they cooperate to maintain the stop mechanism inoperative, but that, upon the cessation of movement of the reproducing member, there shall be a differential or relative movement between these elements to cause the actuation of the stop mechanism. It will be apparent, however, that the same operation may result upon a material variation in the speed of lateral movement of the reproducing member such, for example, as a material decrease in the speed of such movement.

The invention is susceptible of embodiment in a variety of mechanical forms, one of which, for the purpose of illustration, has been selected and described with considerable particularity in the accompanying description, but it is to be expressly understood that such embodiment of the invention is for purposes of illustration only, and is not designed as a definition of the invention, reference being had to the accompanying claims for this purpose.

Referring to the drawings, wherein the same characters of reference designate corresponding parts in the several figures,—

35 Figure 1 is a fragmentary plan view of a talking machine with the stop mechanism of this invention applied;

Fig. 2 is an enlarged sectional elevation of the brake element and its support;

40 Fig. 3 is a plan view of the stop mechanism;

Fig. 4 is a fragmentary plan view with the swinging arm removed to illustrate the setting mechanism;

45 Fig. 5 is a fragmentary side elevation, partly in section, showing the setting mechanism;

Fig. 6 is a section on the line X^e—X^e of Fig. 4, showing the relation of the parts of the stop mechanism after the same has been actuated; and

Fig. 7 is a side elevation of the stop mechanism showing the parts in their normal relation during the lateral traverse of the record tablet by the sound-reproducing member.

Referring in detail to the drawings, wherein the same reference characters indicate corresponding parts in the several figures, 60 1 represents the casing of the usual or any conventional talking machine, 2 the turn-table driven by a motor (not shown) within the casing 1, and 3 any conventional disk sound-record tablet supported upon and rotated by the turn-table 2, the turn-table and

tablet constituting a rotating member. Above and adapted to cooperate with the record tablet is a reproducing member, shown as comprising the usual or any conventional sound-box 4 communicating with and carried by the usual tone-arm 5, which together constitute a traveling member. The tone-arm is rotatably mounted in any usual or conventional way upon a bracket 6 in communication with a sound-amplifier, as indicated in dotted lines in Fig. 1, the reproducing member being normally progressed across the record tablet by the coaction between the sound-box and the record groove.

Mounted upon the bracket 6, in any desired or suitable way, is a supporting member 7, preferably in the form of a bent rod, carrying at its upper end the plate-like member or table 8. Extending through this table 8 at about the central portion thereof is a pivot pin 9. Mounted upon the table 8 and secured in pivotal relation therewith by the pivot pin 9 is the T-shaped supporting arm 10 provided at its outer end with upturned flanges 11 and 12. The flange 12 is provided at its upper edge with a horizontally extending ear 13 from which is supported in suspended relation a headed pivot pin 14. The pivot pin 14 is secured in the ear 13 in any conventional way, as by screw-threaded engagement, a lock-nut 15 being provided to securely lock the pin in its proper position. Supported on the head of the pin 14 are two dished disk-shaped members 16 and 17 which embrace at their periphery a brake member 18. This brake member may be in any preferred form, but in the embodiment disclosed consists of an annulus of frictional material, such as rubber, securely clamped and retained in position by the disks 16 and 17. The disks 16 and 17, together with the brake member 18, constitute a rotary brake element freely rotatable upon the pin 14.

Also mounted upon the pin 14 above the brake element, is a rotary stop member 19, freely rotatable upon the pin 14, and providing the projecting portion 20 for a purpose hereinafter described. Between the disk 16 and the stop member 19 is a spring member 21 provided with arms which bear at their outer extremities against the dished portion of the disk 17, such spring member being separated from the plate 17 at the center by a washer. This spring member provides a frictional or yielding connection between the stop member 19 and the brake element, whereby they normally rotate as a unit but are capable of independent rotation.

Above the stop member 19, on the pin 14, is mounted a worm 22 provided with a flange 23, which may be integral with the worm, and which flange bears upon and rotates with the stop member 19. It is apparent that any desired means may be provided for

locking the flange 23 to rotate with the stop member 19. In gear with the worm 22 is a worm-wheel 24 supported on the end of a threaded shaft 25 which has bearings in the flanges 11 and 12.

Also extending between the flanges 11 and 12 is a rod 26. Mounted on the rod 26, to rock and slide thereon, is a pivoted arm or lever 27 provided at 28 with a tooth or threaded member adapted to mesh or engage with the threaded member 25. The lever 27 is extended beyond the tooth 28 to provide the weighting extension 29, and this lever is also extended in the opposite direction from the rod 26 to provide the finger 30. Also mounted upon the rod 26 in pivotal relation therewith is the gravity member 31 comprising inturned flanges 32 and 33, which are received in pivotal relation on opposite ends of the rod 26, and the connecting member 34. Extending from the member 34 and transversely thereto, is the arm 35 provided at its outer extremity with the extension 37 running parallel to the connecting member 34. The extremity of the extension 37 is inclined upward at right angles thereto to provide a cam surface at 38. Also depending from the extension 37 is a lug or stop-pin 39 adapted at the proper time to be moved into the path of the projection on the stop member 19 to stop the rotation of the latter.

Mounted on the pin 9 and in pivotal or revoluble relation therewith, is an arm 40, at the outer end of which is a second arm 41 horizontally pivoted on the arm 40 by means of the pivot 42. Depending from the arm 41 is the lug 43 adapted at the proper time to bear on the extension 37 and depress the lug 39. The arm 41 is extended to provide the finger 44, which is adapted at the proper time to bear upon the finger 30 and tilt the lever 27 to raise the tooth 28 out of engagement with the threaded member 25. The arm 41 is also provided with a diagonal slot 45 adapted to receive therein a pin 46 extending upwardly from the upper face of the lever 27. The pin 46 is reduced at the upper portion thereof to provide the shoulder 46', upon which the arm 41 may rest, the pin 46 constituting a trip for the arm 41.

Below the pivoted arm 40 is a plate-like member 47 frictionally held in engagement with the arm 40 by the spring member 48. The plate-like member 47 is also mounted in pivotal relation with the pin 9 and is adapted, owing to the frictional connection provided by the spring 48, to move the arm 40 about the axis of the pin 9. Extending from the plate 47 is an arm 49 provided with an upturned forked extremity 50.

Mounted in pivotal relation with the plate 8 is an arm 51 which extends upwardly from the plate 8, then horizontally over the arm 40, through the fork of the extension

50, and then upwardly to provide the extension 52 which is secured to the tone-arm 5 in any suitable way, as by a clamping member 53.

Depending from the plate 47 is an eccentric pin 54 adapted to coact with the forked end 55 of a lever 56 pivoted on the arm 10 at 57. The lever 56 is provided with a down-turned lug 58 adapted to play in a slot formed by the edge of the arm 10 and an extension 59 on the table 8. Surrounding the pivot 57 is a spring 60 which bears at its opposite ends upon the arm 10 and the depending lug 58. The lever 56 is extended to provide a finger 62.

The operation of the device is as follows:

Assuming the tone-arm and sound-box to be at the inner end of the record groove, as shown in Fig. 1, the sound-arm is first moved outwardly to a position adjacent the periphery of the record. Movement of the tone-arm 5 carries with it the rod 51 which, through the forked extremity 50, moves the plate-like member 47 and therewith the pivoted arm 40. Arm 40 carries with it arm 41, which, through the engagement of the edge of the slot 45 with the pin 46, slides the lever 27, which is then tilted by the engagement of fingers 30 and 44 so that tooth 28 is out of engagement with the threaded member 25, along the rod 26, until the lever is restored to initial position. As the tone-arm is moved farther, plate-like member 47 will slip relatively to arm 40. The rotary movement of plate-like member 47 also causes the eccentric pin 54, acting in the slot provided by the forked end 55, to swing the lever 56 about its pivot 57 to the position shown in dotted lines in Fig. 4, forcing the finger 62 into contact with the cam surface 38. The parts are so timed that finger 62 will not engage cam surface 38 until lever 27 has been restored to initial position. The camming action produced by the finger 62 on the surface 38 causes the arm 35, and therewith the lug 39, to be raised, and the extension 37 of the arm 35, bearing on the lug 43, raises arm 41 above the shoulder 46'. When the arm 41 is thus raised, finger 44 is withdrawn from finger 30, permitting lever 27 to tilt, because of the weighting extension 29, until tooth 28 engages threaded member 25, in which position it is ready to be driven thereby. Upon further movement of the lever 56, the depending lug 58 engages the extension 59, and operates thereon as a fulcrum, the lever 56 then moving, through its pivot 57, the arm 10 about its pivot 9 against the tension of the spring 60, and withdrawing thereby the arm 10 and its supported members, including the brake element, from the position shown in Fig. 1 to a position wherein the brake element is out of engagement with the turn-table.

The sound-box being then placed in opera-

tive relation with the record, it begins to travel inwardly through the coaction of its usual needle with the record groove. Movement of the tone-arm inwardly moves the
 5 rod 51, and thereby, through the extension 49, the plate-like member 47 is rotated about its pivot 9, causing the eccentric pin 54 to move toward the central portion of the slot formed by the fork 55, permitting lever 56
 10 to follow. The first result of this movement is that the arm 10 is permitted to be swung about its pivot 9, through the force exerted by the spring 60, to bring the arm 10 and its supported members into normal
 15 working relation with the turn-table, whereby the brake element is brought into frictional engagement with the periphery of the turn-table and thereupon begins to rotate, lug 39 being then held out of the path
 20 of projecting portion 20 by finger 62 bearing on cam surface 38. Rotation of the brake element produces a rotation of the worm 22 which, through worm-wheel 24, drives the threaded member 25. Threaded member 25
 25 and its driving mechanism are so designed as to drive lever 27 approximately synchronously with the movement of the arm 41 by tone-arm 5, any difference in speed being in favor of the arm 41, so as to insure that the
 30 edge of slot 45 shall be held against the reduced extension of pin 46. When the threaded member begins to rotate, it feeds lever 27, and thereby pin 46, longitudinally, and arm 41, which has been held stationary
 35 relatively to the lever 27 by engagement with the pin 46, with a resultant slipping between arm 40 and plate-like member 47, now begins to keep pace with the pin 46, because the tone-arm tends always to drive
 40 the arms 40 and 41, through the frictional connection between arm 40 and plate-like member 47, at approximately the same rate of movement and at least at as great a speed as that at which it is advanced by the record
 45 groove. The further movement of the tone-arm inwardly permits a further swing of the lever 56, whereby the finger 62 is withdrawn from engagement with the cam surface 38. Arm 35 with its extension 37
 50 is thereby permitted to drop, and arm 41 is correspondingly lowered until the edge of slot 45 rests on the shoulder 46' of pin 46. The lug 39 will not, however, fall into the path of the projecting portion 20, as the arm
 55 35 is over-weighted by the connecting member 34, whereby the gravity member 31 normally swings about the rod 26 to maintain the lug 39 elevated. As the tone-arm continues to swing inwardly arms 40 and 41
 60 move therewith, the edge of the diagonal slot 45 is held against the reduced extension of the pin 46 projecting therethrough, and the arm 41 is supported on the shoulder 46'. The arm 41 and the lever 27 with its pin 46
 65 now move as a unit, until the tone-arm ceases

to advance for any reason, as when it has reached the end of the record groove. Arm 41 then also ceases further movement, and the brake element, being still in contact with
 70 and rotated by the turn-table, continues to drive the threaded member 25, whereby the lever 27 is further advanced and shoulder 46' is withdrawn from under the edge of the slot 45. Thereupon arm 41 falls through
 75 gravity, its finger 44 engaging the finger 30 and raising the tooth 28 out of contact with the threaded member 25, and its lug 43 pressing down upon the extension 37 and overcoming the weight of the member 31,
 80 whereby the lug 39 is forced down into the path of the projecting portion 20 of the rotary stop member 19, stopping further rotation of this member. Thereupon the rotary brake element immediately produces a
 85 retarding and braking action upon the turn-table, the frictional connection between the brake element and the stop member 19 permitting a slight slipping between the brake element and the stop member, until the turn-
 90 table, and thereby the motor, is brought to a stop, the provision of this frictional connection preventing injurious jars.

It will be apparent that a material variation in the speed of advance of the tone-arm, such as a material decrease in its speed of
 95 advance, will similarly decrease the speed of advance of the arm 41, whereby pin 46 with its shoulder 46' will be advanced out from under the edge of the slot 45 to cause the
 100 actuation of the brake element as above described. It will also be apparent from the above detailed description that a stop mechanism has been provided which is controlled
 105 by the movement of the tone-arm without the necessity of prior manual manipulation of adjustable parts, and which operates immediately upon the cessation of movement of the tone-arm to effect the stopping of the machine.

While the preferred embodiment has been
 110 described with considerable particularity, it is to be expressly understood that such embodiment is for purposes of illustration only, that the invention is susceptible of a variety
 115 of mechanical expressions, some of which will readily suggest themselves to those skilled in the art, and that such embodiment is not intended as a limitation of the scope of the invention, reference being had to the
 120 appended claims as a definition of the scope thereof.

What we claim is:

1. In combination, a rotating member and a traveling member, a rotating brake element, a stop for said brake element, means
 125 to hold said brake stop inoperative, and means controlled by said brake element to actuate said stop when movement of the traveling member has ceased.

2. In combination, a rotating member and 130

a traveling member, a rotary brake element rotated by said rotating member, and means to maintain said brake element inoperative, said means being controllable by said brake element to stop said brake element.

3. In combination, a rotating member and a traveling member, a rotary brake element, a stop for said element, and means controllable by said brake element for actuating said stop when said traveling member has ceased to move.

4. In combination, a rotating member and a traveling member, a brake element arranged to be rotated by said rotating member, and means to stop the rotation of said brake element when the traveling member has ceased to move, said means being controllable by said brake element.

5. In combination, a rotating member and a traveling member, a brake element arranged to be rotated by said rotating member, a stop for said brake element, means to actuate said stop, and means to hold said stop-actuating means in inoperative position, said means being controllable by said brake element to operate said stop-actuating means when the traveling member has ceased to travel.

6. In combination, a rotating member and a traveling member, a brake element arranged to be rotated by said rotating member, and means acting when the traveling member ceases to move to stop the rotation of said brake element.

7. In combination, a rotating member and a traveling member, a brake element, and means cooperating with said brake element and acting when the traveling member stops to render operative said brake element.

8. In combination, a rotating member and a traveling member, a brake element arranged to be rotated by said rotating member, a stop for said brake element, means controllable by said traveling member, and means controllable by said brake element to maintain said stop inoperative during the movement of said traveling member, said means controllable by said brake element serving to actuate said stop when the movement of said traveling member has ceased.

9. In combination, a rotating member and a traveling member, a brake element arranged to be rotated by said rotating member, a stop for said brake element, means to actuate said stop, and means to hold said actuating means inoperative during the movement of said traveling member, said holding means being controllable relatively to said actuating means by said brake element when said traveling member has ceased to move.

10. In combination, a rotating member and a traveling member, a brake element arranged to be rotated by said rotating member, a stop for said element, means to actu-

ate said stop, and a trip for said actuating means, said trip being controllable by said brake element after said traveling member has ceased to travel, to trip said stop-actuating means.

11. In combination, a rotating member and a traveling member, a brake element rotatable by said rotating member, means for maintaining said brake element normally inoperative, and means for applying the brake upon the cessation of movement of the traveling member.

12. In combination, a rotating member and a traveling member, a brake element rotatable by said rotating member, means to stop the rotation of said brake element, means to hold said stopping means normally inoperative, and means actuating said brake element upon the cessation of movement of the traveling member.

13. In a brake mechanism, the combination with two independently moving members, of a brake member which is mounted to be moved by one of said moving members, and means rendered operative by the stopping of one of said moving members to render said brake member operative to stop the other moving member.

14. In a brake mechanism, the combination of a rotating member and a traveling member, a brake element arranged to be moved by said rotating member, and means to stop the movement of said brake element when the traveling member has ceased to move.

15. In a brake mechanism, the combination of a rotating member and a traveling member, a brake element arranged to be moved by said rotating member, and means to stop the movement of said brake element when the traveling member has ceased to move, said means being controllable by said brake element.

16. In a brake mechanism, the combination of a rotating member and a traveling member, a rotary brake element normally in engagement with said rotating member, and means to prevent rotation of said brake element upon the cessation of movement of said traveling member.

17. In a brake mechanism, the combination of two independently moving members, and rotary means rendered inoperative by the stopping of one of said moving members to stop the other moving member.

18. In a brake mechanism, the combination of two independently moving members, of a brake member which is mounted to engage and move with one of said moving members, and means rendered operative by the stopping of one of said moving members to immobilize said brake member to stop the other moving member.

19. In a brake mechanism, the combination of a rotating member and a traveling

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member, a brake device, and means controllable by said brake device for rendering said brake device operative.

20. In combination, a rotating member and a traveling member, an element moving with said traveling member, a pivoted lever associated with said element, a screw imparting movement thereto, and a stop mechanism, said element and pivoted lever moving relatively to actuate said stop mechanism.

21. In combination, a rotating member and a traveling member, an element moving with said traveling member, a pivoted member associated with said element, a screw imparting movement thereto, and a stop mechanism, said element and pivoted member moving relatively to stop said rotating member.

22. In combination, a rotating member and a traveling member, an element moving with said traveling member, a pivoted member associated with said element, means imparting movement to said pivoted member, and a stop mechanism, said element and pivoted member moving relatively to stop said rotating member.

23. The combination, with a rotating element and a traveling element, of a brake device adapted to contact with one of said elements, a stop for said device, and means for actuating said stop to immobilize said brake device when one of said elements has ceased to move.

24. The combination, with a rotating element and a traveling element, of a brake device adapted to contact with said rotating element, a stop for said device, and means for actuating said stop to immobilize said brake device when one of said elements has ceased to move.

25. In a device of the character described, the combination of a rotating element, a traveling element, a brake device adapted to contact with said rotating element, a stop for said device, and means for actuating said stop to immobilize said brake device when said traveling element has ceased to travel.

26. The combination with two independently moving members, of a stop member which is mounted to be moved by one of said moving members, and means rendered operative by the stopping of one of said moving members to render said stop member immediately operative to stop the other moving member.

27. The combination with a rotating member and a traveling member, of an arm movable with said traveling member, a revoluble element associated with said arm and engaging said rotating member, and means rendered operative by the stopping of said traveling member to cause said revoluble element to stop said rotating member.

28. The combination with a rotating

member and a traveling member, of a pivotally mounted arm movable with said traveling member, a revoluble element associated with said arm and engaging said rotating member, and means rendered operative by the stopping of said traveling member to cause said revoluble element to stop said rotating member.

29. In combination, a rotating member and a traveling member, a revoluble element movable with said traveling member, and means rendered operative to stop said rotating member upon the stopping of said revoluble element.

30. The combination with a rotating member and a traveling member propelled thereby, of stopping mechanism for the rotating member continuously controlled and maintained inoperative by the traveling member while in motion and automatically becoming immediately operative upon the stopping of the traveling member.

31. The combination with a rotating member and a traveling member propelled thereby, of normally inoperative stopping mechanism for the rotating member comprising two associated elements movable by the said rotating and traveling members respectively, the said mechanism automatically becoming immediately operative upon the stopping of the element movable with the traveling member.

32. The combination with a rotating member and a traveling member propelled thereby, of stopping mechanism for the rotating member comprising two elements normally moving in continuous engagement with each other and separately actuated by the said rotating and traveling members respectively.

33. The combination with a rotating member and a traveling member propelled thereby, of stopping mechanism for the rotating member comprising an element movable thereby and an element movable with the traveling member and while so moving continuously engaging the first said element to maintain the stopping mechanism inoperative.

34. The combination with a rotating member and a traveling member propelled thereby, of stop mechanism for the rotating member comprising two elements normally moving in continuous engagement with each other, one actuated by the said rotating member and the other actuated by the traveling member through a yieldable connection.

35. The combination with a rotating member and a traveling member propelled thereby, of a stop device and controlling means therefor comprising two movable elements one of which is adapted to cause the stop device to operate and the other of which normally engages the first to render the stop device inoperative, an actuating connection

between the traveling member and the first said element, and an actuating connection between the rotating member and the second said element.

5 36. The combination with a motor, a motor-driven rotating member and a traveling member normally propelled by the rotating member, of a motor-actuated stop device and motor-actuated controlling means
10 for the stop device serving to automatically stop the rotating member upon the stopping of the traveling member and to permit the starting of the rotating member upon move-
15 ment of the traveling member to a position adjacent the periphery of the rotating member.

37. The combination with a rotating member and a traveling member propelled thereby, of stopping mechanism for the rotating
20 member continuously controlled and maintained inoperative by the traveling member while moving at normal speed and automatically becoming immediately operative
25 upon a predetermined variation of the speed of the traveling member from the said normal speed.

38. The combination with a rotating member and a traveling member propelled thereby, of normally inoperative stopping mechanism for the rotating member comprising
30 two associated elements movable by the said rotating and traveling members respectively, the said mechanism automatically becoming immediately operative upon a predetermined
35 variation of the speed of the element movable with the traveling member.

39. In combination with a rotating member and a traveling member propelled thereby, of a brake for the rotating member, and
40 means whereby the brake becomes operative upon a predetermined variation in speed of one of said members.

40. In combination with a rotating member and a traveling member propelled thereby, of a brake for the rotating member, and
45 means whereby the brake becomes operative upon a predetermined decrease in speed of one of said members.

41. In combination with a rotating member and a traveling member propelled thereby, of a brake for the rotating member, and
50 means whereby the brake becomes operative upon the stopping of one of said members.

42. In combination with a rotating member and a traveling member propelled thereby, of a brake for the rotating member, and
55 means whereby the brake becomes operative upon a predetermined variation in speed of said traveling member.

43. In combination with a rotating member and a traveling member propelled thereby, of a brake for the rotating member, and
60 means whereby the brake becomes operative upon a predetermined decrease in speed of
65 said traveling member.

44. In combination with a rotating member and a traveling member propelled thereby, of a brake for the rotating member, and means whereby the brake becomes operative
70 upon the stopping of said traveling member.

45. In combination with a rotating member and a traveling member propelled thereby, of a stop mechanism for the rotating member, and means whereby said stop mechanism becomes immediately operative upon
75 a predetermined variation in speed of one of said members.

46. In combination with a rotating member and a traveling member propelled thereby, of a stop mechanism for the rotating
80 member, and means whereby said stop mechanism becomes immediately operative upon a predetermined decrease in speed of one of said members.

47. In combination with a rotating member and a traveling member propelled thereby, of a stop mechanism for the rotating member, and means whereby said stop mechanism becomes immediately operative upon
85 the stopping of one of said members.

48. In combination with a rotating member and a traveling member propelled thereby, of a stop mechanism for the rotating member, and means whereby said stop mechanism becomes immediately operative upon
90 a predetermined variation in speed of said traveling member.

49. In combination with a rotating member and a traveling member propelled thereby, of a stop mechanism for the rotating
100 member, and means whereby said stop mechanism becomes immediately operative upon a predetermined decrease in speed of said traveling member.

50. In combination with a rotating member and a traveling member propelled thereby, of a stop mechanism for the rotating member, and means whereby said stop mechanism becomes immediately operative upon
105 the stopping of said traveling member.

51. In combination with a rotating sound-record member and a sound-reproducing member coöperating therewith, of a brake for the sound-record member, and means
110 whereby the brake becomes operative upon a predetermined variation in speed of one of said members.

52. In combination with a rotating sound-record member and a sound-reproducing member coöperating therewith, of a brake
120 for the sound-record member, and means whereby the brake becomes operative upon a predetermined decrease in speed of one of said members.

53. In combination with a rotating sound-record member and a sound-reproducing member coöperating therewith, of a brake for the sound-record member, and means
125 whereby the brake becomes operative upon the stopping of one of said members. 130

54. In combination with a rotating sound-record member and a sound-reproducing member coöperating therewith, of a brake for the sound-record member, and means
5 whereby the brake becomes operative upon a predetermined variation in speed of said reproducing member.

55. In combination with a rotating sound-record member and a sound-reproducing
10 member coöperating therewith, of a brake for the sound-record member, and means whereby the brake becomes operative upon a predetermined decrease in speed of said reproducing member.

56. In combination with a rotating sound-record member and a sound-reproducing member coöperating therewith, of a brake for the sound-record member, and means whereby the brake becomes operative upon
20 the stopping of said reproducing member.

57. In combination with a rotating sound-record member and a sound-reproducing member coöperating therewith, of a stop mechanism for the sound-record member,
25 and means whereby the stop mechanism becomes immediately operative upon a predetermined variation in speed of one of said members.

58. In combination with a rotating sound-record member and a sound-reproducing member coöperating therewith, of a stop mechanism for the sound-record member, and means whereby the stop mechanism becomes immediately operative upon a prede-
30 termined decrease in speed of one of said members.

59. In combination with a rotating sound-record member and a sound-reproducing member coöperating therewith, of a stop mechanism for the sound-record member, and means whereby the stop mechanism becomes immediately operative upon the stop-
40 ping of one of said members.

60. In combination with a rotating sound-record member and a sound-reproducing member coöperating therewith, of a stop mechanism for the sound-record member, and means whereby the stop mechanism becomes immediately operative upon a prede-
45 termined variation in speed of said reproducing member.

61. In combination with a rotating sound-record member and a sound-reproducing member coöperating therewith, of a stop mechanism for the sound-record member, and means whereby the stop mechanism becomes immediately operative upon a prede-
55 termined decrease in speed of said reproducing member.

62. In combination with a rotating sound-record member and a sound-reproducing member coöperating therewith, of a stop mechanism for the sound-record member, and means whereby the stop mechanism be-

comes immediately operative upon the stop- 65
ping of said reproducing member.

63. The combination with a rotating member and a traveling member normally propelled thereby, of stop mechanism serving automatically to stop the rotating member
70 upon the stopping of the traveling member and to permit the starting of the rotating member upon movement of the traveling member to a position adjacent the periphery of the rotating member. 75

64. The combination with a rotating record member and a sound-reproducing member coöperating therewith, of stop mechanism serving automatically to stop the record member upon the stopping of
80 the reproducing member and to permit the starting of the record member upon movement of the reproducing member to a position adjacent the periphery of the record member. 85

65. The combination of a rotary member and a traveling member normally propelled thereby, of a stop device and means controlled by said traveling element automati-
90 cally rendering said stop device operative upon the stopping of said traveling member and automatically rendering said stop device inoperative upon movement of said traveling member to a position adjacent the periphery of the record member. 95

66. The combination of a rotary record support and a tone-arm coöperating there-
100 with, of a stop device and means moved by said tone-arm automatically rendering said stop device operative upon the stopping of said tone-arm and automatically rendering said stop device inoperative upon the move-
ment of said tone-arm to a position adjacent the periphery of said record support.

67. In combination with a motor and a
105 traveling member propelled thereby, of a stop device, and means moved by said motor and member respectively and differentially movable to render operative said stop device upon a predetermined variation in
110 the speed of said member.

68. In combination with a motor and a traveling member propelled thereby, of a stop device, and means moved by said motor and member respectively and differen-
115 tially movable to render operative said stop device upon the speed of said member decreasing below a predetermined limit.

69. In combination with a motor and a traveling member propelled thereby, of a
120 stop device, and means moved by said motor and member respectively and differentially movable to render operative said stop device upon the stopping of said member.

70. The combination with a rotating mem- 125
ber and a traveling member propelled thereby, of a stop device and controlling means therefor comprising two normally engaging

movable elements, and driving connections between said elements and said members respectively, one of said connections comprising frictionally-engaging parts.

5 71. The combination with a rotating member and a traveling member propelled thereby, of a stop device and controlling means therefor comprising two normally engaging movable elements, and driving connections
10 between said elements and said members respectively, the connection between said traveling member and its driven element comprising frictionally-engaging members.

72. In combination with a motor and a
15 traveling member normally propelled thereby, of a stop device and controlling means therefor comprising a device driven by said motor and a device moved by said traveling
20 element in engagement with said first motor-driven device, said controlling means automatically rendering said stop device operative upon the stopping of said traveling element.

73. In combination with a motor and a
25 traveling member normally propelled thereby, of a stop device and controlling means therefor comprising a threaded member driven by said motor, and coacting means moved by said traveling member.

30 74. In a brake mechanism, the combination of two independently moving members, and brake means rendered operative by a predetermined variation in speed of one of said moving members.

75. In a brake mechanism, the combination of two independently moving members, and brake means rendered operative by a predetermined decrease in speed of one of said moving members. 35

76. In a brake mechanism, the combination of two independently moving members, and brake means rendered operative by the stopping of one of said moving members. 40

77. In a brake mechanism, the combination of two independently moving members, and brake means rendered operative by a predetermined variation in speed of one of said moving members to stop the other moving member. 45

78. In a brake mechanism, the combination of two independently moving members, and brake means rendered operative by a predetermined decrease in speed of one of said moving members to stop the other moving member. 50

79. In a brake mechanism, the combination of two independently moving members, and brake means rendered operative by the stopping of one of said moving members to stop the other moving member. 55

In testimony whereof we affix our signatures in the presence of two witnesses. 60

GUADALUPE BUELNA.
ARTHUR E. BURSON.

Witnesses:

JOSEPH H. BURSON,
JOHN P. HAESSE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

SOUND REPRODUCING STYLUS,
#1,221,348-----J.C.Mercer,
Patented-April 3rd, 1917.
Filed-December 6th, 1915.

J. C. MERCER.
SOUND REPRODUCING STYLUS.
APPLICATION FILED DEC. 6, 1915.

1,221,348.

Patented Apr. 3, 1917.

FIG. 2

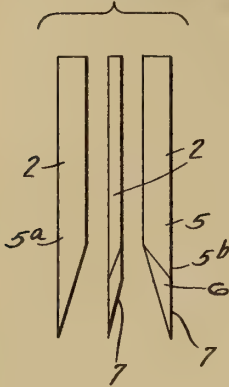


FIG. 3

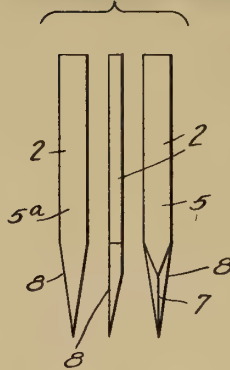


FIG. 4

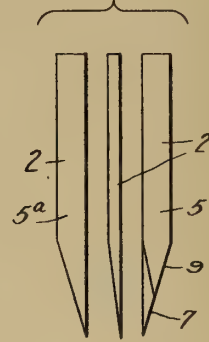
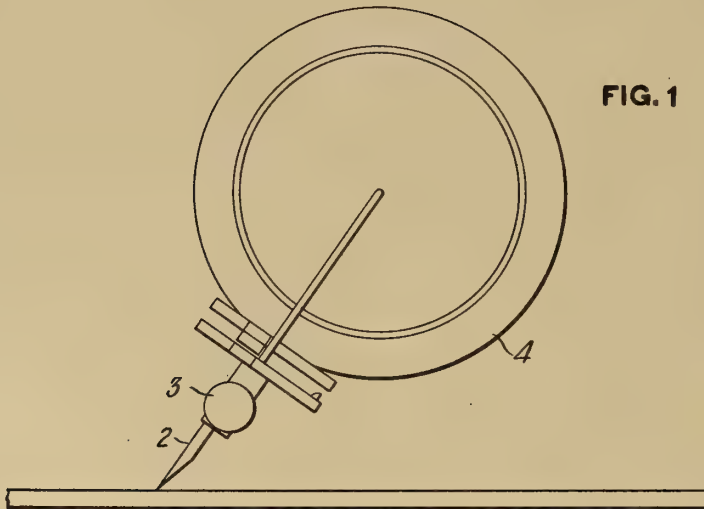


FIG. 1



WITNESSES

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UNITED STATES PATENT OFFICE.

JOHN C. MERCER, OF PITTSBURGH, PENNSYLVANIA.

SOUND-REPRODUCING STYLUS.

1,221,348.

Specification of Letters Patent.

Patented Apr. 3, 1917.

Application filed December 6, 1915. Serial No. 65,282.

To all whom it may concern:

Be it known that I, JOHN C. MERCER, a citizen of the United States of America, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented new and useful Improvements in Sound-Reproducing Styli, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, forming part of this specification.

This invention is a new and improved needle or stylus by means of which sounds are reproduced from the record of a phonograph or similar sound reproducing machine. It has been customary to make this needle from steel and from fiber or similar substances, and it is a well known fact that the use of a steel needle is not only injurious to the delicate records but it produces harsh metallic tones and is unable to effectively transmit the lesser and more delicately sustained tones, while the fiber needle or the like, results in such softness of tone as to make it unsuitable for general use. Furthermore, the fiber needle is objectionable on account of the ready wear or breaking down of its operative point.

The object of my invention is to provide a needle which shall not be injurious to the record, which shall reproduce at a moderate tone and which is therefore comprehensive of a large number or range of records, which shall have the maximum wearing qualities, and which can be made at a very low cost.

To the above end, I make a needle of bone which is preferably treated, as hereinafter set forth, for the purpose of building up the qualities aforesaid.

I will now describe my invention so that others skilled in the art to which it appertains may understand and construct the same, it being apparent that so far as the shape of the needle is concerned, changes may be made without departing from the invention as herein claimed.

Figure 1 is an enlarged elevational view of a reproducing head or sound transmitting box of a phonograph, having applied thereto a needle embodying my invention, and Figs. 2, 3 and 4 indicate in elevation groups of needles constructed in accordance with my invention and all to be hereinafter more fully described.

To prepare the bone for the formation of the needle I preferably first subject it to a

thorough steaming or boiling to remove a greater part of the nitrogenous or organic matter. I next apply heat to the bone sufficiently to refine its texture through contraction and elongation of the canals and cavities thereof. Removal of the greater portion of the nitrogenous constituent and refinement of the bone results in a character of material of great density of structure but which is not too brittle and which effectively resists at its operative point destruction due to vibratory impact on the face of the record and other wear. If desired, the bone before being made up into the needle, or the needle, may be given an additional hardening treatment by subjecting it to the action of tannic acid. This effects a desirous surface or superficial hardening.

Although not limited to any particular shape, I find that I obtain striking results in the use of a needle of either of the shapes illustrated in Figs. 2, 3 and 4. It will of course be understood that the needle is provided with a shank or body portion 2 by means of which it is held in the vise 3 of the reproducing head 4. In Fig. 2 the operative point of the needle is shown as formed by cutting away on an angle the flat face 5 so as to form a plane 6 which intersects the plane of the opposite flat face 5^a at an angle, producing an edge 7 in the plane of the side 5^b. With the needle placed in the holder or vise 3 of the sound reproducing head, this edge 7 lies disposed toward the face of the record.

In Fig. 3 the edge 7 is formed by uniformly beveling the face 5.

In Fig. 4 is shown a needle similar in shape to that of Fig. 2. However, the edge of the needle is cut away as at 9 to form a point and the face 5^a is cut way opposite the edge 9 in a plane intersecting the plane of the face 5^a, to form the operative edge 7.

It will of course be understood that I do not limit myself to any particular shape, and it will also be apparent that modifications may be made in the method of treating the bone preparatory to forming the needle.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A sound reproducing stylus of bone free from a part of its organic constituent and having its operative point hardened.

2. A sound reproducing stylus formed of bone free from a part of its organic con-

stituent and having an operative point of a density caused by structural shrinkage and by hardening.

5 3. The method of making a sound reproducing stylus from bone, which consists in dissolving the organic constituent of the bone, drying the bone to produce structural

shrinkage, cutting the stylus from the bone and then hardening the operative point of the stylus.

In testimony whereof I have hereunto set my hand.

JOHN C. MERCER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

APPARATUS FOR PRODUCING COMPANION AUDITORY
AND VISUAL RECORDS FOR SIMULTANEOUS
REPRODUCTION,

#1,221,407-----E. H. Amet,
Patented-April 3rd, 1917.
Filed-April 21st, 1913.

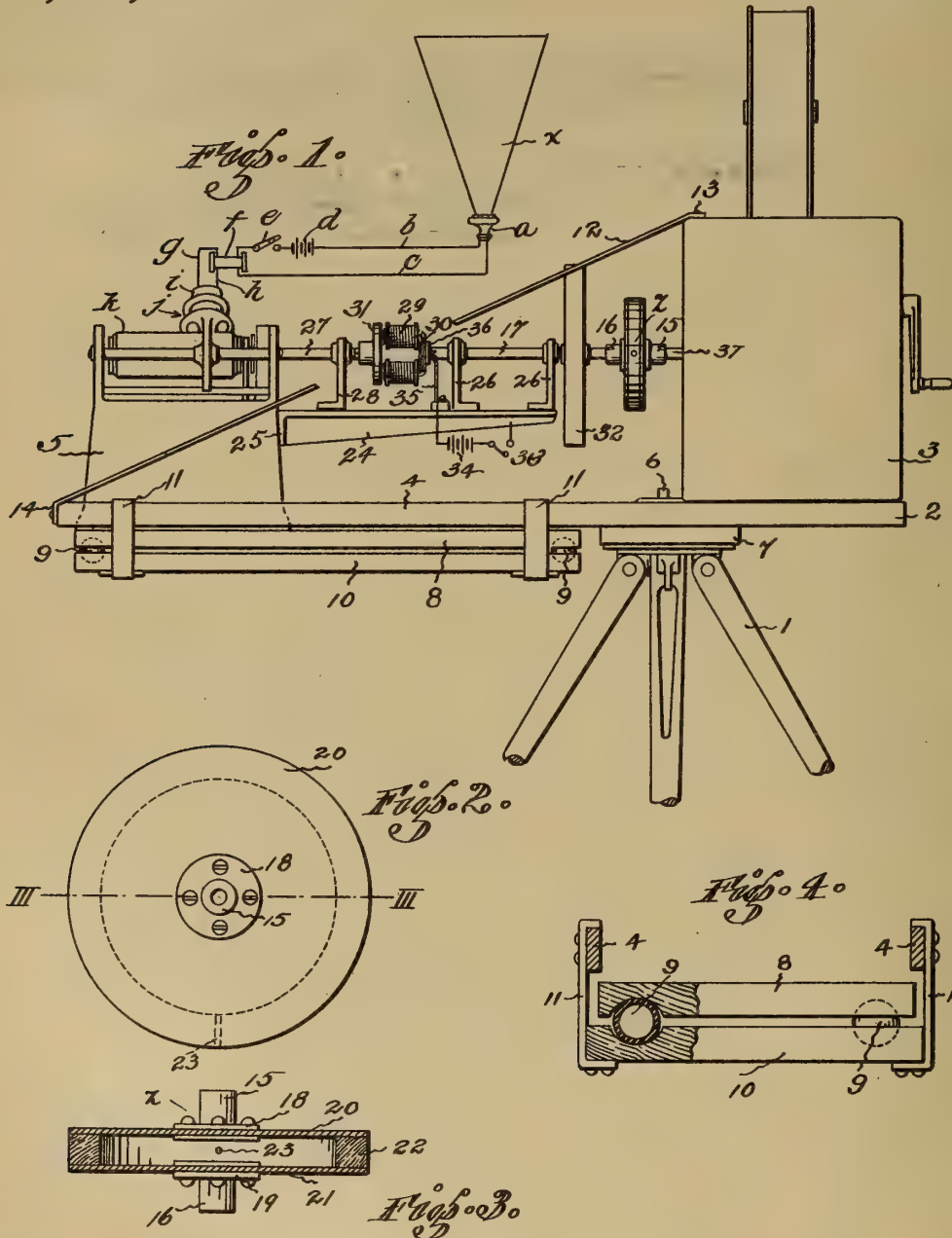
E. H. AMET.

APPARATUS FOR PRODUCING COMPANION AUDITORY AND VISUAL RECORDS FOR SIMULTANEOUS
REPRODUCTION.

APPLICATION FILED APR. 21, 1913.

1,221,407.

Patented Apr. 3, 1917.



WITNESSES:

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APPARATUS FOR PRODUCING COMPANION AUDITORY AND VISUAL RECORDS FOR SIMULTANEOUS REPRODUCTION.

1,221,407.

Specification of Letters Patent.

Patented Apr. 3, 1917.

Original application filed December 22, 1912, Serial No. 738,809. Divided and this application filed April 21, 1913. Serial No. 762,553.

To all whom it may concern:

Be it known that I, EDWARD H. AMET, a citizen of the United States, and a resident of Redondo Beach, in the county of Los Angeles, State of California, have invented a new and useful Apparatus for Producing Companion Auditory and Visual Records for Simultaneous Reproduction, of which the following is a specification.

Attention is directed to my co-pending application filed Dec. 22, 1912, Serial No. 738,809, out of which application this application has been divided.

An object of this invention is to provide means whereby companion photographic and sound records may be so made that the reproduction of desired scenes with their accompanying sounds may be effected in a satisfactory manner.

In order to effect such satisfactory reproduction it is necessary that the sound and picture records shall be produced in unison, and that the sound record shall be kept free from markings produced otherwise than atmospherically.

The synchronous production of companion motion picture and sound records for the reproduction of motion pictures with sound accompaniment has long been sought, but in making such reproductions available to the public certain difficulties are encountered, some of the causes of which I will now point out, viz:

The sound collecting means must be sufficiently close to the motion picture subject to collect the sound accompanying the action. The motion picture machine and sound recording machine should be directly coupled to secure absolute synchronism in the simplest way, but the motion picture machine produces mechanical sounds which are apt to be made a part of the sound record and which would be objectionable in a reproduction of sounds to accompany the picture, and the direct coupling has heretofore proven unsatisfactory.

An object of this invention is to produce an apparatus in which the two record-making machines are directly coupled and which will effectively avoid all the difficulties involved and will enable the operator with perfect ease and freedom to secure synchronous companion records which can be successfully employed for reproducing without extra-

neous mechanical noises, the action and sound of the motion picture subject.

The motion picture machine should be movably mounted so as to bring the motion picture subject within the range of the camera. Such camera movement should be independent of the placement of the sound collecting means. The motion picture machine and the sound recording machine must operate with exact synchronism. Means for maintaining synchronism between the motion picture machine and the sound recording machine, when such machines are placed at any considerable distance apart, are necessarily extensive or intricate and require more or less personal attention for keeping the connecting apparatus, of electrical or other character, true. The motion picture machine and the sound recording machine must be close together in order to mechanically connect the two machines for synchronous operation. This I do by mounting the motion picture machine on a base having a hollow frame extension at its side and the sound recording machine on a base suspended in said hollow frame alongside of the other base and by making the picture machine base sufficiently movable to secure the required range for the camera, directly coupling the two machines together in alinement for synchronous action, providing means to effect said coupling and also providing non-vibration-transmitting mounting means for supporting the sound record machine on the suspended base; and actuating the sound recording machine telephonically by means of a sound collector in a telephonic circuit.

I regard this invention as pioneer in that I directly connect the driven shaft of a motion picture machine with the drive shaft of a phonographic machine by means of a non-vibration-transmitting coupling interposed between the ends of said shafts and provide a non-vibration-transmitting mounting interposed between the bodies of said machines to prevent the transmission to the recording stylus of mechanical vibration foreign to the desired phonographic record.

The invention possesses other advantageous features which, with the foregoing, will be set forth at length in the following description, where I shall outline in full that form of invention selected for illustration in the drawings accompanying and forming

part of the present specification. The novelty of the invention will be included in the claims succeeding said description. From this it will be apparent that I do not restrict myself to the showing made by said drawings and description, as I may adopt many variations within the scope of my invention as expressed in said claims.

To insure definite uniformity in the speed of the respective machines, the most practical method is to mount the phonograph record mandrel on an integral extension of the drive shaft of the motion picture camera. The essential disadvantage of this is the conductivity of the shaft, for vibratory sounds emanating from the camera and conducted to and absorbed by the phonograph record. After long and tedious experimenting, the novel shaft coupling herein disclosed, preferably consisting of a drumlike structure having the contiguous shaft ends attached to the leather heads of the drum, was evolved and found to perfectly isolate the phonographic record from all extraneous vibrations conducted by the camera shaft.

In the drawings:

Figure 1 is a view partly diagrammatic and partly in side elevation of apparatus constructed in accordance with this invention.

Fig. 2 is an end elevation of the non-vibration-transmitting shaft coupling interposed between the shafts of the motion picture machine and the sound recording machine.

Fig. 3 is a cross section of the same taken on the line III—III, Fig. 2.

Fig. 4 is an end elevation of the non-vibration-transmitting mounting for the sound recording machine partially in cross section to disclose the placing of the interposed balls.

The art of producing "talking pictures" calls for a working combination between the record making motion picture machine or camera and the sound recording machine. Vibration and noise is characteristic of the picture machine, while absolute silence in the mechanism of the sound recording machine is essential.

Near synchronism of the phonographic record accompanying a contemporaneous motion picture is not sufficient; they must be in absolute unison, and this is possible only when they are so made and so reproduced.

In detail the construction consists of the usual motion picture tripod 1, and of the portable outfit for making records, or any suitable table or foundation in the fixed or reproducing outfit. The base consists of a platform 2 to receive the camera 3, and has the side extensions 4 forming a hollow frame in which the sound recording machine 5 is hung. This base is revoluble in a horizontal

plane around the vertical pivotal pin 6, fixed to the tripod head 7. The sound recording machine rests upon the support 8 which is mounted on non-vibration-transmitting means formed by hollow, spherical rubber balls 9.

The action of the hollow spherical balls 9 is peculiar, said balls being non-vibration-transmitting and having walls of even thickness. A solid ball will not accomplish the purpose of a hollow ball. A solid ball will polarize a vibration propagated on the sub-base side and communicate it (to a certain extent deadened) to the sound recording machine support 8; whereas a hollow ball under the same circumstances will conduct the vibration circumferentially and lose it at the equator by lateral distortion, or some other undefinable physical effect. Since a sphere is the only body in which all points on its surface are at an equal distance from the center of the body, a point on the surface of a spherical body will resist the same pressure to the same degree as any other point on said surface. This applies also to the hollow spheres in which the walls are of even thickness. Thus, the balls serve the purpose of resisting in all directions the pressure that may be exerted upon them by jar or otherwise, so that the sound recording machine support 8 is thereby always held in a comparatively unchanging position within the frame.

The purr of the gears and the click of the intermittent feed of the picture machine, communicated to the driven shaft 37 and to the base 2, and the extensions 4, are intercepted and eliminated by the shaft coupling *a* and by the cushioning balls 9 on the sub-base 10, which, hung in the extension frame 4 by the brackets or hangers 11 and thereby insulated from the vibrations of the base, therefore coöperates with the balls to prevent sound vibrations from the camera from reaching the sound recording machine through said base. The frame is steadied by the strap 12 extending from the top of the camera at 13 to the frame at 14.

The sound-collector *a* may be an ordinary phonograph horn and the same is connected to electrical transmitting means operated thereby and comprising a telephone transmitter circuit including the telephone transmitter *a*; the primary circuit, including the telephone transmitter wires *b*, *c*, battery *d*, switch *e*, the primary winding, not shown, of the induction coil *f*, the secondary winding, not shown, of said induction coil *f*, and the secondary circuit wires *g*, *h* on the telephone receiver *i*; the same being operably connected with the sound recording means *j*, *k* of the sound recording machine 5.

The extension sleeve couplings 15 and 16 are respectively fixed to the ends of the drive shaft of the camera and the intermediate

shaft 17. These sleeves are provided with the flanges 18 and 19, that are fixed to the heads 20 and 21, that are joined together by being fixed (preferably by adhesion) to the annular wooden or fiber ring 22. This drumlike structure is vented through the hole 23 to relieve any concussion due to end thrust from either of the joined shafts, or the heads may be open in spider like construction. The heads 20 and 21 are preferably of oil-impregnated flexible leather, or sheet rubber having sufficient tensile strength to transmit the power necessary for rotation without buckling or distortion. Having no sound conducting properties, the heads 21 and 20 isolate the respective machine shafts, and intercept any sound vibrations that might otherwise be transmitted from the motion picture drive shaft. The flexibility of this novel coupling also compensates for any disalignment of the joined shafts and acts as a "universal joint."

The extension arm 24 is attached to the side of the sound recording machine at 25. The pillar bearings 26 attached to this arm act as mountings for the shaft 17. This shaft is fixed in axial alinement with the mandrel shaft extension 27 of the phonograph, journaled in the out bearing 28 mounted on the arm 24.

The magnetic clutch comprises the magnets 29—29 fixed upon the core bar 30, that is fixed upon the end of the shaft 17, and the armature disk 31, that is slidably splined on the end of the extension shaft 27. It is the function of this clutch to instantly and positively set, to start the phonograph mandrel rotating at full speed when the clutch circuit is closed, as hereinafter described. The shaft 17 rotates constantly with the camera shaft. The relatively heavy fly wheel 32 fixed upon the shaft 17 has more than sufficient stored momentum at all times to overcome the inertia of the sound recording machine mechanism, to instantly start the same at full speed when the magnetic clutch locks.

The magnet clutch is operated by closing the switch 33 causing the current to pass from the battery 34, through the brush contact 35 bearing against a commutator 36, to which one end of the windings of the magnet coils is attached; the opposite end of the said windings is grounded on the shaft 17 through which the current flows back through the switch 33 to the battery, completing the circuit. The armature 31 is slidable on the squared end of the shaft 27 and is instantly engaged by the attraction of the magnets 29 to start the shaft 27 at full speed when the clutch is set.

By the interposition of the coupling in the shaft, and the vibration absorbing means between the base, the sound recording machine is completely isolated from any sounds

or vibratory effects emanating from the picture machine and liable to be absorbed by the phonographic record.

The phonographic record may be made telephonically whereby the receiving horn *x* may be located at a distance from the machine, sufficient to fail to record the operating noises of the motion picture machine.

Having thus described this invention, what I claim and desire to secure by Letters Patent is:

1. In combination with a motion picture machine having a driven shaft, a sound recording machine having its drive shaft attached to and in alinement with said driven shaft; a non-vibration-transmitting mounting for the sound recording machine, said mounting consisting of hollow, spherical balls; and a non-vibration-transmitting coupling between the ends of said shafts.

2. In combination with a base, a motion picture machine thereon having a driven shaft; a sound recording machine on said base having its drive shaft attached to and in alinement with said driven shaft; a non-vibration-transmitting coupling between the ends of said shafts; and a non-vibration-transmitting mounting between said base and said sound recording machine, said mounting consisting of hollow, spherical balls.

3. In combination with a base, a motion picture machine thereon having a driven shaft; a sound recording machine on said base having its drive shaft attached to and in alinement with said driven shaft; a non-vibration-transmitting coupling and a clutch between the ends of said shafts; and a non-vibration-transmitting and equally in all directions pressure-resisting mounting between said base and said sound recording machine.

4. An apparatus for producing companion motion pictures and sound records, comprising a base having integral therewith a hollow frame at one end; means between the hollow frame and the other end of the base for pivotally mounting said base; a motion picture machine mounted upon said base between said pivotal means and said last-named end; a non-vibration-transmitting mounting suspended from said base within said hollow frame, said mounting consisting of hollow, spherical balls; a sound recording machine mounted on said mounting; said machines being provided with shafts virtually in alinement with each other; and a non-vibration-transmitting means connecting said shafts for rotating them simultaneously.

5. In an apparatus for producing motion pictures and sound records, comprising a motion picture machine and a sound recording machine having telephonic means for re-

ceiving and transmitting sounds to the record thereof; said machines being provided with shafts virtually in alinement with each other; a non-vibration-transmitting coupling between the ends of said shafts for driving said recording machine in synchronism with the motion picture machine; said machines being mounted on bases; one of said bases being suspended over the other; 10 a non-vibration-transmitting mounting between one of said machines and one of said bases, said mounting consisting of hollow, spherical balls; and a pivotal support for the suspending base.

15 6. An apparatus for controlling the direction of movement for a combined motion picture and sound recording machine consisting of a suspending base and a base sus-

pending therefrom; said suspending base being pivotally mounted; said suspended base 20 having non-vibration-transmitting means for supporting said sound recording machine thereon, said mounting consisting of hollow, spherical balls, said machines being arranged in substantially horizontal aline- 25 ment with each other; and a non-vibration-transmitting coupling between said machines.

In testimony whereof, I have hereunto set my hand at San Francisco, California, this 30 12th day of April, 1913.

EDWARD H. AMET.

In presence of—
BALDWIN VALE,
J. B. GARDNER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

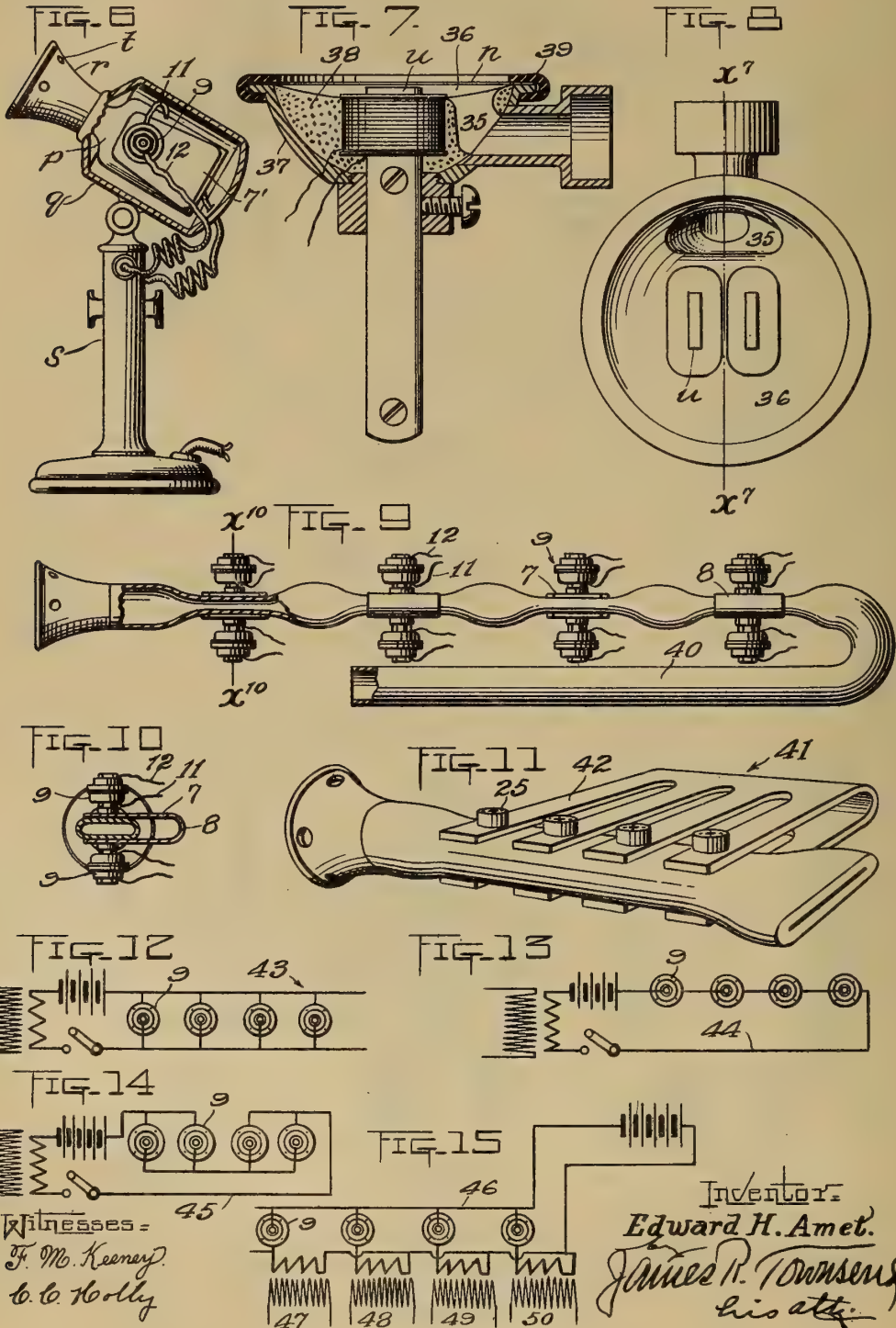
MEANS FOR REPRODUCING
VIBRATIONS,

#1,221,408-----E. H. Amet,
Patented-April 3rd, 1917.
Filed-May 27th, 1914.

E. H. AMET.
MEANS FOR REPRODUCING VIBRATIONS.
APPLICATION FILED MAY 27, 1914.

1,221,408.

Patented Apr. 3, 1917.
2 SHEETS—SHEET 2.



Witnesses:
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Inventor:
Edward H. Amet.
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UNITED STATES PATENT OFFICE.

EDWARD H. AMET, OF REDONDO BEACH, CALIFORNIA.

MEANS FOR REPRODUCING VIBRATIONS.

1,221,408.

Specification of Letters Patent. Patented Apr. 3, 1917.

Application filed May 27, 1914. Serial No. 841,397.

To all whom it may concern:

Be it known that I, EDWARD H. AMET, a citizen of the United States, residing at Redondo Beach, in the county of Los Angeles and State of California, have invented a new and useful Means for Reproducing Vibrations, of which the following is a specification.

The invention includes a novel telephone transmitter and receiver adapted for use in a system in which these form parts of an electric circuit whereby sound waves and the like may be electrically transformed, transmitted and reproduced or recorded or both, with practical integrity.

I also employ the method and system in the transmission and reproduction of writing capable of mechanically actuating the mechanism for operating an ordinary talking machine sound transmitter.

Said system is capable of being used in various ways and for various purposes and is adapted for use with talking machine reproducers and recorders and also for use independently of such reproducers and recorders.

The invention is adapted for use in telephone systems and in wireless telephony, owing to the practicability of operating many variable resistances synchronously.

The invention includes a sound wave transformer which I term a pulsator because the sound waves that actuate it produce pulsations, each part of which corresponds directly and exactly to the energy of that part of the sound wave which produces it.

The possibility of actuating a number of variable resistances in synchronism and of making practicable numerous electrical combinations of electrical resistances for various purposes, makes the pulsator a valuable factor in the wireless art for the transmission of articulate speech and reproduction of written messages and of sketches or other desired subjects. I am using it now to transmit oral and written messages and to send any depressed picture or design which may be produced by a stylus pencil or pen: the system including a telephone or other circuit, and employing two or more talking machines having synchronous revolving cylinders.

Objects of the invention are:—

To provide for a telephone system, means whereby sound waves or the like may be perfectly transformed, transmitted and re-

produced, or recorded by a sound reproducing or recording device, as a talking machine;

To provide a sensitive sound wave receiving pulsator which will impart to one or more microphone variable resistances, sound waves in true proportion to the energy of the sound waves actuating the pulsator;

To provide means whereby sound impulses may be accurately transmitted and reproduced electrically;

To provide a sound wave actuated pulsator which is absolutely true in its synchronism with the sound waves actuating it and which will impart to a variable electrical resistance, as a microphone, pulsations representing in direct ratio and true proportion, the energy of the sound waves received;

To provide a pulsator which will actuate a multiple of variable resistance units adapting it for controlling heavy battery currents or for energizing a single circuit from each electrical resistance element or allowing of series or multiple connection of the variable resistance element for use in wireless telephony or loud talking announcing systems, or in recording systems; and

To provide means whereby a microphone variable resistance may be made to produce electrical impulses in true proportion and in time with the actuating vibrations.

The invention is applicable in a system comprising a transmitter and a reproducing receiver each in themselves novel in construction, that will reproduce sounds actuating it, said reproduction being natural in quality.

It is also applicable in a system of electrical transmission which may be employed for the purpose of transmitting sound impulses or the like to be recorded upon talking machine record devices; the same to accompany a motion picture.

By this invention I provide means for actuating a plurality of variable resistances as a unit to either send the impulses from the respective resistances to individual receiving stations, or to couple the resistances in series or multiple for use in wireless telephony or in other arts where it is desirable to set up strong electrical impulses from sound wave impulses.

The invention involves means whereby sound wave impulses may be electrically transmitted and reproduced free from mechanical

noises such as those produced by over-vibration of the transmitting diaphragm and the receiving diaphragm, by reason of their not being deadbeat or in positive synchronism with the actuating sound wave impulses electrically transmitted and reproduced.

After years of experimenting in the reproduction of sounds by electrical transmitting and reproducing means I have discovered that the recording and reproducing of sound waves and like vibrations, may be effected with perfect integrity by applying the vibrations to energize an electrical circuit by alternate stress and reflexive action, and applying the energy of said circuit to produce in the reproducing and recording means, direct and reflexive actions corresponding with the stress and reflexive actions, respectively, of the initial vibrations, and I have discovered that a pulsator or sound wave receiving chamber constructed of a rubber tube partially flattened having two walls or portions free to vibrate, said walls or portions preferably being opposed to each other, the whole forming a receiver chamber for sound wave impulses, will so transform the energy that said impulses will cause the opposing walls of the device to pulsate or vibrate in absolute synchronism and proportion with the sound wave vibrations, and that variable electrical resistances actuated by said walls through the medium of tuning fork collectors compressing said walls, will produce variations in an electrical circuit corresponding in proportion to the pulsations of the pulsator walls. I have discovered that a pulsator formed of rubber confined between the prongs of a clamping device of tuning fork character made dead-beat by direct contact with the rubber pulsator and connected with a variable electrical resistance will impart to such resistance, in their purity, the true vibrations for electrical transmission.

The opposing walls or vibrating members of the pulsator I have thus invented are non-resonant, free from tin-tinnabular vibration, and by collecting the vibrations from opposite sides of the tuning fork construction, the vibrations are carried forward in their purity, free from molecular tone and echo vibrations. The variable electrical resistances employed in combination with the pulsator, the whole forming an electrical transmitter; are carried by the vibrating walls, are overhung therefrom and have no solid back means of adjustment; in lieu of the former solid back adjustment they have an added weight which allows the full free vibration of the pulsator walls and allows the true value of the pulsations to be impressed upon the variable resistance medium employed.

I find that an electrical transmitter constructed as above and further described in

the drawings and the detail description herein, will from a fixed position receive and transmit a whisper or a shout—the whisper and the shout being electrically transmitted and reproduced each perfectly and in the instance of the shout as well as the whisper, there is not the slightest tendency to break, blur or rattle.

I have discovered that for successfully recording electrically transmitted sounds upon talking machine devices, success of recording the sounds depends upon having the reproduced sound waves received and recorded while maintaining through all the several steps the direction of movement of the original sound wave recorded. For this purpose I have constructed a telephone receiver having its sound wave outlet opening from the air chamber situated on the side of the diaphragm receiving the magnetic impulse. In this manner the impact of the sound wave to be transmitted is maintained as to original direction; all pressures producing pressures and vice versa.

While this telephone system was designed to be used in connection with talking pictures for the recording of sounds simultaneously with the photographing of a subject and for the reproduction of the sound with the reproduction of the motion picture subject, and for duplicating sound records, I do not wish to limit my invention to this use of the new method of the new system, or the several elements which are novel and new to the art.

The construction of the electrical transmitter herein described makes it possible to actuate a multiple of variable electrical resistances attached to the pulsator and each is practically equally actuated. A variety of changes in the connections of the resistances may be made to adapt the transmitter for use in the art of wireless telephony and in connection with announcing telephone systems where large volumes of sound clearly reproduced are required at one or more stations.

The complete electrical apparatus constructed as shown and described in the accompanying drawings and the subjoined specification will transmit speech, music or other sounds without tendency to overbeat and will accurately reproduce and record the same.

The apparatus being adapted to handle large amounts of current may be used to great advantage in long distance telephone service, and may be used for recording telephone messages so that they may be articulately reproduced.

It is well known that sounds produced by telephones, phonographs and the like, lack something in timbre or tone color and it is an object of this invention to supply such lack.

It is also well known that there are limitations to the volumes of sound that can be produced from or through the agency of the diaphragms of sound reproducers such as telephones, dictagraphs, dictaphones, phonographs and the like. An object of this invention is to lessen or eliminate such limitations.

The invention will be understood by reference to the accompanying drawings.

Figure 1 is a view mainly diagrammatic and partly sectional illustrating a recording and reproducing telephone system such as may be constructed through the carrying out of this invention. The apparatus is shown as being constructed and adjusted for transmitting and simultaneously reproducing and recording sounds from a sound record.

Fig. 2 is a side view of a pulsator constructed in accordance with this invention and provided with four microphone variable resistances.

Fig. 3 is a sectional elevation viewed from irregular line x^3 , Fig. 2; one of the resistances being shown intact.

Fig. 4 is a section indicated on line x^4 , Fig. 3.

Fig. 5 is a side elevation of a spring clip for mounting the variable resistances on the pulsator.

Fig. 6 is a view of the pulsator having separated resonant members and arranged as a transmitter for ordinary telephone use. The variable resistances are connected in series. The housing is partly in section.

Fig. 7 is a view of the receiver partly in vertical section on line x^7 , Fig. 8.

Fig. 8 is a plan of the sound chamber of the telephone receiver shown in Fig. 7.

Fig. 9 is a fragmental view of part of a sound transmitting system, comprising a pulsator formed of non-resonant india rubber tube compressed at intervals into flattened chambers by means of opposing members forming vibration collectors for the variable electrical resistances.

Fig. 10 is an elevation partly in section on line x^{10} , Fig. 9.

Fig. 11 is a view of another form of pulsator for actuating multiple microphone resistances, not shown; the same being omitted from their seats.

Fig. 12 is a diagram of a circuit having microphone resistances connected in multiple.

Fig. 13 is a diagram showing the microphone resistances connected in series.

Fig. 14 is a diagram showing the microphone resistances connected in multiple series.

Fig. 15 is a diagram showing a plurality of microphones taking battery from a common source for individual circuits.

In Fig. 1 a designates a telephone transmitter, and b a telephone receiver connected therewith and also with an amplifying horn

c , d indicates a second telephone receiver and e a second telephone transmitter. The receiver d is shown connected with a phonograph recorder f . The telephone transmitter a is shown provided with a mouth piece g and a detachable tube h is shown in said mouth piece to transmit sound vibrations from a phonograph reproducer i operated by a phonograph record j . The transmitter e is shown provided with a large collecting horn k .

The phonograph recorder f is shown operating upon a record blank m .

The telephone receiver b' is also in a circuit with the transmitter a .

The parts above named are arbitrarily arranged in the system shown for the purpose of illustration.

The transmitter a is shown connected with the various receiving appliances b , b' , d , through appropriately arranged telephone circuits, each including a sound collector or pulsator p .

The pulsator is constructed as a chamber having an inlet 1 and two vibrating walls 2, 3, that are opposed to each other and are preferably flattened throughout a considerable area. The edges of these walls may be connected integrally as at 4 on two or more sides and in practice there is formed inside the pulsator a thin widened cavity 5 filled with air and open in one direction as at 1 to receive the sound waves to be translated or transformed.

Preferably the outer end of the inlet 1 is circular in cross-section and its walls merge gradually into the flattened walls 2, 3.

The pulsator may be molded of India rubber or formed by flattening a piece of India rubber tubing, one end being left open to form the inlet, and the flattened part being closed opposite said inlet. Such closing forms an end wall 6 and may be effected by compressing the flattened walls together at a distance from the inlet and cementing or otherwise fastening them together.

It is understood that a good degree of success can be secured by extending the tube a considerable distance beyond the flattened portions of the tube, there being thus formed an air column or body that acts as a resistance sufficiently great to give lateral direction to pulsations imparted through the inlet to the body of air in the flattened or widened chamber.

The pulsator walls are mutually opposed to each other by reason of being subject to simultaneous actuation in opposite directions by the same pressure, such as that set up by a sound wave.

One form of the transmitter will be understood by reference to Figs. 1, 2, 3, 4 and 5, in which clamp means in the form of a clip or clamping member, comprising opposing resonant members or limbs 7 con-

ected by a bend 8 is engaged with the flattened non-resonant side walls 2, 3. On any or all of these limbs may be secured the variable electrical resistances 9, one or more to each limb. The resonant members

may be separate plates fastened to the side walls. Said resistances may be ordinary electrical telephone transmitter resistances or any other form of variable electrical resistance, or the equivalent therefor, the same being connected with a source of current as the battery 10 in the usual manner by the leads 11, 12, and with the primary winding 13 of an induction coil of a telephone transmitting circuit.

The air body contained in the chamber 5 having non-resonant oppositely arranged vibrating walls 2, 3 and which forms part of this invention acts through said walls and the resonant members 7 the variable resistance 9, the battery circuit 1 and the primary winding 13, energizing the secondary winding 14 in the secondary circuit, including the leads 15, 16, one of which has a condenser 17 and the other a switch 18; and being connected to energize the magnets *n* of a receiver as *b*, *b'*, or *d*, either of which may be connected with suitable means as an amplifying horn *c*, *c'*, or with a recording device *f* for applying the transmitted impulse to the desired purpose; as for announcing through the horn *c* or for recording through the combining connections 19, 20 and the device *f*.

When the single pole switch 18 in lead 16 is open, as shown in Fig. 1 and the combining connections 19, 20, are connected by the double pole switch 21 with the conductors 22, 23, which form a portion of the telephone circuit including the receiver *d*, the transmitter *a* is connected to operate the receiver *b* and the receiver *d* simultaneously. By operating switch 21 to open the connections 19, 20, and closing the switch 18, the telephone receivers *b* and *b'*, alone respond to the impulses in the battery circuit.

By throwing the double pole switch 21 to connect conductors 22, 23 to complete the circuit 24 energized by the second transmitter *p'*, sound impulses collected by the horn *k* can be directed to operate the receiver *d* and the recording device *f* to make the record on the record device *m*.

The limb 7 of the pulsator clip is provided with an insulated seat 25 into which is screwed the stem 26 of the pulsating contact 27 of the variable resistance button 9 and the opposing contact 28 is overhung and weighted, as by the stabilizing weight 29 to stabilize the contact 28 against which the impulses of the variable resistance medium 30 are applied, so that said impulses are confined only by the inertia of the opposing contact and its stabilizer 29 which may

be embodied as an integral part of said contact.

The effect of this construction and arrangement is substantially as follows:

The sound vibrations acting through the air in the air chamber 5 are transformed into to-and-fro motion by the non-resonant vibratory wall that acts upon the limb 7; and the vibratory movement set up in the air body at 5 acts freely to compress the variable resistance medium against the opposite contact 28 which is free to yield to the impulses or vibrations transmitted from the air chamber through the wall; but is substantially stable to allow the compression of the variable resistance medium to produce a corresponding electrical stress. The action in this respect may be somewhat likened to the use of a hammer held against a rivet being set, the diaphragm 31 and the weighted contact tending to maintain a fixed position relative to the pulsatory contact 27.

In this manner the most delicate operation of the resistance is effected and over-compression of the variable resistance medium is avoided, which is impossible in cases where the contacts are not free to move together.

In Figs. 3 and 4 a metal frame 32 formed of a suitable wire bent to sustain the edge walls of the chamber is provided, the same being capable of being inserted through a distensible mouth 33 of said chamber in which mouth there is afterward inserted a bushing 34 in which is inserted the inlet tube 1, that may be of metal or other material that will hold its shape. Or the chamber may be constructed open at the end 6 to receive the frame 32 and the open end at 6 be cemented and closed.

In Fig. 6 the pulsator *p* is contained in a housing *q* provided with a perforated mouthpiece *r* and pivotally mounted on a telephone stand *s*. The perforations *t* in the mouthpiece *r* are to avoid confining the air in the mouthpiece in case the lips of the speaker are applied directly to the rim of the mouthpiece, it being desirable in all instances to maintain a free vibration of the air in the air chamber and to avoid back pressure caused by the speaker's breath.

Referring now to Fig. 7 which is an enlarged sectional view of a typical construction for the receivers *b*, *b'* or *d*, it will be seen that the sound wave outlet 35 directly communicates with that side of the diaphragm *n* that receives the impulses from the magnet *u*, there being a shallow air chamber 36 in which the active end of the magnet terminates. Said chamber is preferably formed inside the diaphragm-supporting housing 37 by means of a non-resonant filling 38 of beeswax, paraffin or similar substance, the hollow space of the

chamber being plano-convex, the diaphragm *n* forming the boundary of the plane side so that the hollow space is reduced in thickness as it approaches the rim of the diaphragm, which rim is held in place on the rim of the housing 37 by means of an elastic channel band 39 which may be formed of an ordinary rubber band stretched over the rim of the housing and diaphragm.

Any suitable clamping means may be employed in lieu of the band shown.

It will be seen by reference to Figs. 1, 3 and 7 that the stress of the air vibrations in air chamber 5 applied against the variable resistance medium 30 will produce a magnetic stress on the magnet *u*, thereby attracting the diaphragm *n* and producing a pneumatic stress on the air in the air chamber 36 of the receiver; and that such stress, therefore, is applied to the work to be performed, as the production of sound through the amplifying horn *c* or the production of the record on the record device *m*; and that such stress will be impressed upon the record in positive form; and, vice versa, the reflex action at 5 will be reproduced at 36, and at the point of the stylus. By thus making the direct action of the sound vibration to reproduce direct action throughout, and likewise the reflexive action to produce reflexive action throughout, it is made possible to reproduce as a sound or as a depressed record, whatever depressed writings may be applied to the sending record device, and it is readily understood from this description that if the writings upon the sending record are in the nature of chirography or in the nature of drawings that the same chirography and the same drawings will be applied to the receiving record, having been telephonically transmitted as sound wave impulses.

While I have only shown a cylindrical record device, it is understood that the invention is not limited to the use of cylinders and that any talking machine record device may be utilized.

It is also well understood in the art that flat record sheets may be applied to the cylindrical surface by any suitable means so that an impressed writing on a flat sheet may be applied for sending a message or drawing to a cylindrical receiving record device.

The material I have herein termed rubber is soft india rubber or its equivalents or substitutes and is not the material known as hard rubber.

In Figs. 9 and 10 a multiple pulsator is shown made from a piece of rubber tube 40 compressed at intervals by the limbs 7 of the variable resistance mounting clips.

In Fig. 11 the clip 41 is provided with a plurality of clip fingers 42 each of which is provided with the insulated seat 25 to receive the variable resistance buttons.

In Fig. 12 the variable resistance buttons 9 are shown in multiple with the battery circuit 43 for producing low resistance.

In Fig. 13 they are connected in battery circuit 44 to produce a high resistance.

In Fig. 14 the variable resistances are connected in battery circuit 45 to produce a total resistance of one-half the combined resistance of the variable resistances.

In Fig. 15 the variable resistances are shown connected in a common battery circuit 46 for energizing independent telephone circuits 47, 48, 49, 50.

The different connections shown in Figs. 12, 13, 14, and 15, are for obtaining the different degrees of conductivity in the said combinations to adapt the variable resistances to transmit to telephone circuits the desired quantity of current for the purpose to be accomplished.

In practical operation the opposed flattened nonresonant walls 2, 3, are moved only with the stress and reflexive action of the air vibrations from the one air body and the mutually opposing action of the nonresonant walls effects perfect deadbeat, there being no reverberation or overtone disturbance of the air in said chamber, and the variations of pressure on each wall is the same because both are produced by the same thin air body.

The condenser 17 in the secondary circuit is employed for the purpose of improving the action of the telephone receiver.

A principle of this invention is that the sound impulses are taken from the diaphragm of the receiver *b* or *d* in exact correspondence with the delivery of said impulses to the transmitting diaphragm. That is to say, a pressure from the air acting on the transmitting diaphragm is delivered as a pressure upon the air by the receiving diaphragm, and vice versa.

In this respect the receiver *d* has the inner or impulse receiving side of its diaphragm in opposition to the diaphragm *x* of the talking machine recording means *f*.

In Fig. 6 the resonant member 7' is shown as a plate of metal, hard rubber, fiber or the like cemented to the non-resonant wall and serving like the limb 7 in Fig. 3 to collect the pulsations of the wall and to support the variable resistance and impart it to the vibrations collected.

I claim:—

1. A vibration transmitter comprising non-resonant opposing vibrating rubber walls having an air containing space between them; a variable electrical resistance to be actuated by vibrations from said walls; and a spring-fork vibration collector and transmitter having flat parallel limbs compressing and flattening and holding said walls flat and in opposition to each other and connected with the variable electrical

resistance for imparting the vibrations transmitted through said walls from said air-space.

2. A telephone transmitter including a
5 pulsator having two soft rubber vibrating walls, means to simultaneously apply a sound wave vibration to both of said walls, variable electrical resistance, means comprising a resonant fork compressing both of
10 said walls for imparting the movement of said pulsator walls to the variable electrical resistance for the electrical transmission of the vibrations set up in said walls.

3. A telephone transmitter including a
15 pulsator having two mutually opposed non-resonant flattened walls formed of soft rubber, means comprising a clamping fork of spring material compressing both of said walls for applying sound wave energy to the
20 opposing walls, means for imparting the movement of said pulsator walls to variable electrical resistances for the electrical transmission of the vibrations of said walls.

4. A sound wave collecting pulsator comprising a non-resonant soft rubber housing
25 having flexible walls, suitable means for

collecting and directing into said pulsator sound waves to actuate said flexible walls, means comprising a resonant fork clamping
30 said walls between its members for transforming vibrations of said walls into mechanical energy, and means for utilizing said mechanical energy for the reproduction of said sound waves.

5. The combination with a rubber tube
35 having flattened portions throughout its length, said flattened portions acting as vibrating walls for the purpose of being actuated by sound wave impulses admitted, clamp means comprising a fork of resonant
40 material embracing said flattened portions; and microphone variable resistance in connection with and operated by the members of said fork, the whole forming an electrical
45 telephone transmitter.

In testimony whereof, I have hereunto set my hand at Los Angeles, California this 22d day of May 1914.

EDWARD H. AMET.

In presence of—

JAMES R. TOWNSEND,
L. BELLE WEAVER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

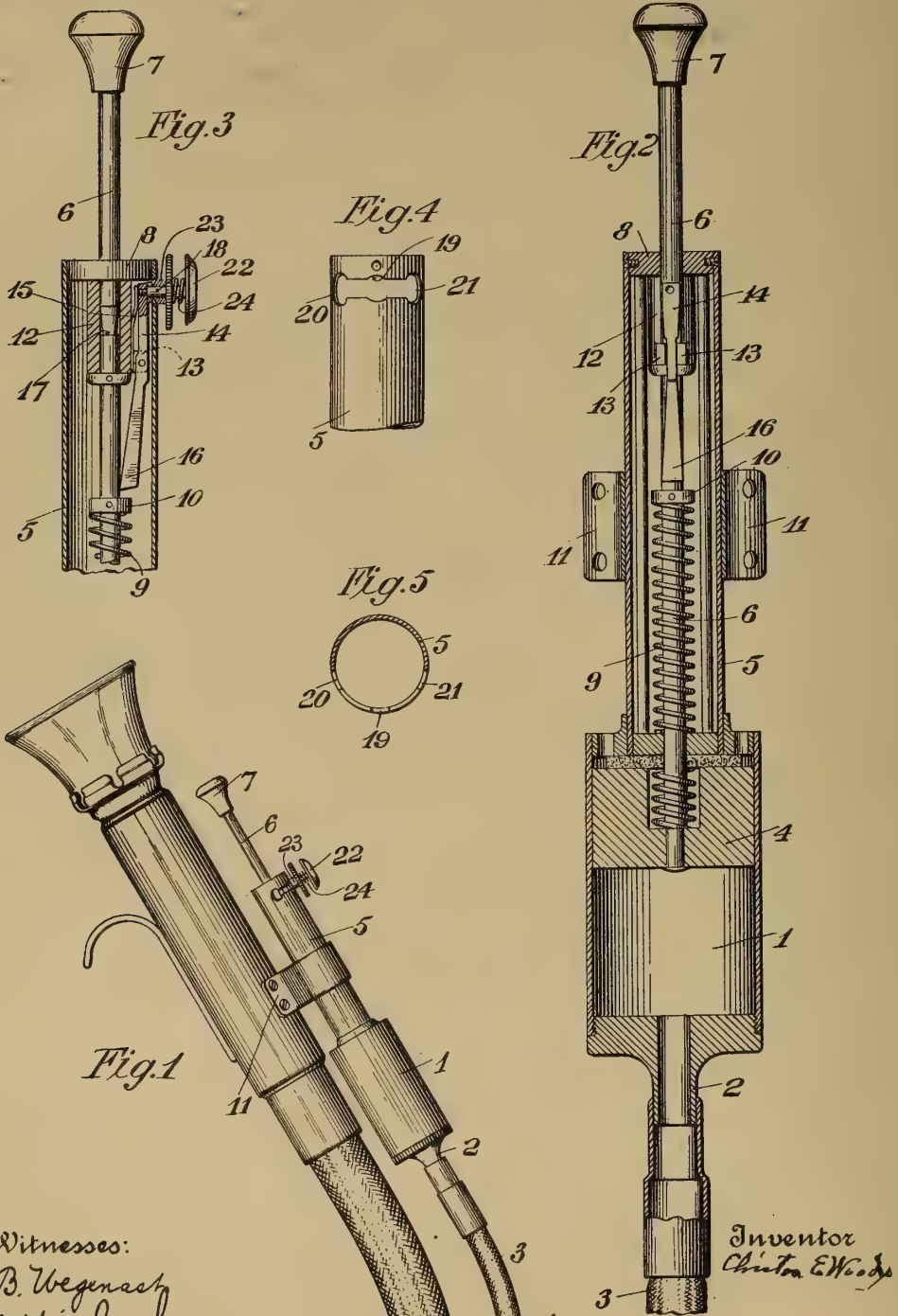
PNEUMATIC HAND CONTROL FOR
TALKING MACHINES.

#1,221,495-----Clinton E. Woods,
Patented-April 3rd, 1917.
Filed-September 11th, 1914.

C. E. WOODS.
PNEUMATIC HAND CONTROL FOR TALKING MACHINES.
APPLICATION FILED SEPT. 11, 1914.

1,221,495.

Patented Apr. 3, 1917.



Witnesses:
J. B. Wegman
R. C. Fitzhugh

Inventor
Clinton E. Woods
By *His* Attorneys
Harris Cameron Lewis & Mason

UNITED STATES PATENT OFFICE.

CLINTON E. WOODS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF VIRGINIA.

PNEUMATIC HAND CONTROL FOR TALKING-MACHINES.

1,221,495.

Specification of Letters Patent.

Patented Apr. 3, 1917.

Application filed September 11, 1914. Serial No. 861,192.

To all whom it may concern:

Be it known that I, CLINTON E. WOODS, a citizen of the United States, and a resident of Bridgeport, Fairfield county, Connecticut, (whose post-office address is care of American Graphophone Co., Bridgeport, Connecticut,) have invented a new and useful Improvement in Pneumatic Hand Controls for Talking-Machines, which invention is fully set forth in the following specification.

This invention consists of a hand-control for talking-machines, particularly those used for dictating correspondence and the like. It is now usual in such machines to locate upon or adjacent to the mouth-piece of the dictation-tube a device for starting and stopping the machine,—or, rather, the hand-actuated member for controlling the start-and-stop mechanism. Usually this hand-device is in the form of a plunger which depresses a piston within a piston-chamber that communicates with the start-and-stop mechanism through a flexible tubing, so as to control said mechanism by pneumatic pressure; but the control may be mechanical or electric, and the hand-actuated member may be something other than a plunger. The present invention, though applicable to any device of this character, will be described in connection with a hand-actuated plunger for a pneumatic control. In these devices, the operator starts the talking-machine by depressing the plunger (or other device), and he has to hold it depressed in order to maintain the machine in operative movement while he is dictating; and as soon as he releases the plunger the machine comes to a standstill.

One object of the present invention is to provide an automatic catch. By this means, the talking-machine, when once started, will continue in operative movement without imposing upon the operator the strain of continuing to hold the plunger (or the like) in operative position, yet can be stopped instantly whenever desired. Another object of the invention is to provide means for rendering such automatic catch inoperative when desired, so that then the talking-machine may be controlled manually in the ordinary manner. The invention, then, consists of the combination, with a suitable hand-control, of an automatic catch; also

of means for rendering such automatic catch inoperative when desired; and also of various features of construction and arrangement hereinafter set forth and claimed.

The invention will be best understood by reference to the accompanying description and by the annexed drawings, which set forth a preferred embodiment thereof by way of illustration rather than as a limitation of the scope of the invention.

In these drawings—

Figure 1 is a general view, on a small scale, of a conventional dictaphone speaking-tube carrying the usual pneumatic hand-control equipped with the new automatic catch;

Fig. 2 is a longitudinal section through the device;

Fig. 3 is a longitudinal section through the upper end of the casing thereof, at right angles to Fig. 2, and showing a side view of some of the interior parts, with the automatic-catch locked in its inoperative position; and

Figs. 4 and 5 are a side-view and transverse section, respectively, of a detail.

The piston-chamber 1 has at its lower end a reduced outlet through a nozzle 2, to which is connected the flexible tubing 3 that leads to the usual start-and-stop mechanism of the talking-machine. The piston 4 is adapted to reciprocate snugly within its chamber. An elongated casing 5 extends from the upper end of the piston-chamber; and the piston-rod 6 passes through casing 5 and extends beyond the same to terminate in a knob 7. At the upper end of the casing is provided a guide 8 for the rod. Within the casing a coiled spring 9 surrounds the rod, with its ends bearing respectively against the upper head of the piston-chamber and against a collar 10 secured rigidly to the piston-rod, for normally holding the piston in its upper position, with the knob 7 protruded, as seen in Fig. 2. A second collar may be secured upon the rod 6, at a suitable distance above said collar 10, to limit the outward travel of the rod. Wings 11—11 are carried by the casing 5, for attaching the device to the dictation-tube, as indicated in Fig. 1.

Within the casing and loosely surrounding the piston-rod, is a sleeve 12 having lugs 13 between which is pivoted a lever whose

upper end 14 carries the blade spring 15 that normally forces the lower end or nose 16 of said lever against the piston-rod. This rod is cut away to provide an annular shoulder 17 so located that when the knob 7 has been pushed down, for starting the talking-machine, the nose 16 will be automatically caused to engage said shoulder and hold the plunger depressed. A spring-pressed plunger-pin 18 extends radially into the casing, through an opening in the upper portion thereof, and acts upon the upper end 14 of the lever, so that by pushing this plunger inward the nose 16 is forced outwardly, thus releasing the piston-rod and enabling the coiled spring 9 to restore the piston and its rod to their normal position.

Referring to Figs. 4 and 5, through the upper portion of the wall of the casing 5 there is a transverse slot having a slight enlargement 19 intermediate the ends thereof and greater enlargements 20 and 21 at the right and left respectively. Upon the outer end of transverse plunger-pin 18 is a push-button 22 and a loose sleeve 23 having a milled head, between which bears the small coiled spring 24. The inner end of this sleeve can enter the end-enlargements 20 and 21, but is too large to enter the intermediate opening 19; and around the inner end of the sleeve 23 is an annular groove which can enter said transverse slot, as indicated in Fig. 3, where the shoulders that define the groove prevent the sleeve being moved inwardly or outwardly.

For utilizing the automatic catch, the inner end of the sleeve as well as of the plunger-pin 18 being inserted into either one of the two enlargements, 20 or 21, the pin itself is then screw-threaded into the upper end 14 of the lever,—which latter can be brought into position to receive the plunger either at 20 or at 21, because it is mounted upon the sleeve 12 that can turn upon the piston-rod 6 as an axis. The plunger-pin can move in and out through the opening in the casing 5, so that the blade-spring 15 can bring the lever-nose 16 into engagement with the shoulder 17 when the knob 7 is depressed,—thus holding the plunger downward and maintaining the talking-machine in operation until, by pressing upon button 22, the catch is released and the main-spring 9 lifts the piston and brings the talking-machine to a standstill. The provision of the two alternative operative positions for the push-button (at 20 and at 21) is for the convenience of left-handed as well as right-handed persons; and the milled head on the sleeve is convenient for making the shift from one position to another.

To render the automatic catch inoperative, the sleeve 23 is drawn slightly outward (by its milled head) and its annular groove inserted into the narrow portion of the

transverse slot, and the sleeve and plunger are then shifted into the intermediate position where they come to rest in the seat 19, with the end-face of said sleeve bearing against and depressing the member 14. This holds the member 14 so far inwardly that its nose 16 cannot engage the shoulder 17 when the knob 7 has been depressed. In consequence, the plunger-rod is free to move up and down, and the user has to hold the knob depressed while using the talking-machine.

The invention has thus been described with considerable detail, but only for the sake of clearness, and in order to illustrate a preferred embodiment of the invention rather than to impose limitations thereon. It will be understood that various modifications may be resorted to, and parts transposed or even omitted, without departing from the spirit of the invention.

Having thus described the invention, what is claimed is:

1. The herein-described control for start-and-stop mechanism for talking-machines, comprising a reciprocable rod having an annular shoulder thereon, a sleeve surrounding said rod and carrying a spring-pressed lever one end of which is adapted to engage said shoulder to hold said rod against reverse movement, a casing surrounding said rod and sleeve and having a transverse slot with an intermediate enlargement and greater enlargements at the two ends thereof, a headed plunger-pin carrying a grooved sleeve adapted to enter the greater end-enlargements aforesaid but not said intermediate enlargement, and a spring interposed between said sleeve and the head of said pin, whereby said pin can be at will secured in engagement with said lever to constitute either right-hand or left-hand releasing-means for the automatic catch provided by said lever and shoulder, and whereby said pin can also be engaged with said lever to lock said automatic catch in inoperative position.

2. The herein-described control for start-and-stop mechanism for talking-machines, consisting of the combination of a manually-actuated device comprising a rod having an annular shoulder thereon, a sleeve surrounding said rod and carrying a spring-pressed lever one end of which is adapted to engage said shoulder, a spring-pressed plunger engaging the other end of said lever for disengaging the same from said shoulder, and means for locking said lever against engagement with said shoulder.

3. The herein-described control for start-and-stop mechanism for talking-machines, consisting of the combination of a manually-actuated device comprising a rod having an annular shoulder thereon, a sleeve surrounding said rod and carrying a spring-pressed lever one end of which is adapted to engage

said shoulder, and a spring-pressed plunger engaging the other end of said lever for disengaging the same from said shoulder.

5 4. The herein-described control for start-and-stop mechanism for talking-machines, comprising the combination of a manual device for actuating said start-and-stop mechanism, a catch brought into operation by the movement of said manual device and
10 thereby maintaining the parts in position for the running-operation of said machine, a second manual device for releasing said catch, and means for preventing said catch from being brought into operation.

15 5. The herein-described control for start-and-stop mechanism for talking-machines, comprising a reciprocable rod having an annular shoulder thereon, a sleeve surrounding said rod and carrying a spring-pressed lever one end of which is adapted to engage said
20 shoulder to hold said rod against reverse movement, a casing surrounding said rod and sleeve and having a transverse slot with an enlargement at each end thereof, and a

plunger-pin adapted to enter either of the enlargements aforesaid, whereby said pin can be at will secured in engagement with said lever to constitute either right-hand or left-hand releasing-means for the automatic catch provided by said lever and shoulder. 25 30

6. The herein-described control for start-and-stop mechanism for talking-machines, consisting of the combination of a manually-actuated device comprising a rod having an annular shoulder thereon, a sleeve
35 surrounding said rod and carrying a spring-pressed lever one end of which is adapted to engage said shoulder, and a spring-pressed plunger engaging the other end of said lever for disengaging the same from
40 said shoulder.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CLINTON E. WOODS.

Witnesses:

JOHN S. GRIFFITH,
LAURETTA T. NEAL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PHONOGRAPHIC STYLUS,

#1,222,139-----F. Ries,
Patented-April 10th, 1917.
Filed-April 10th, 1916.

F. RIES.
 PHONOGRAPHIC STYLUS.
 APPLICATION FILED APR. 10, 1916.

1,222,139.

Patented Apr. 10, 1917.

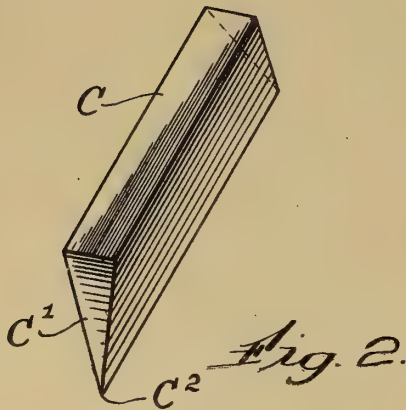
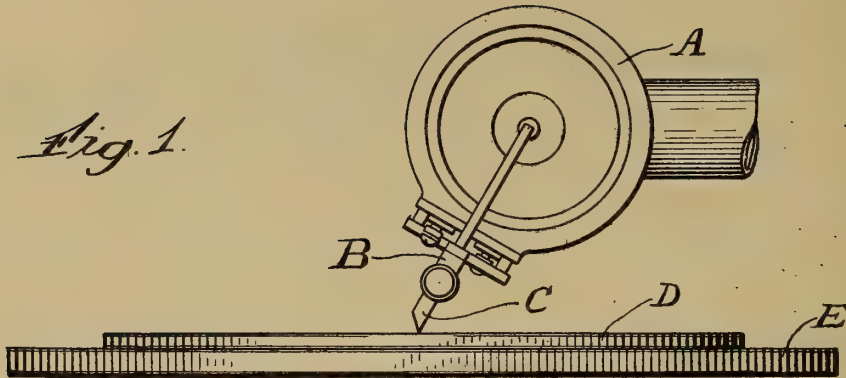


Fig. 3.

Witnesses:
Chas. Glavatt
Robert H. Burton.

Inventor:
Fred Ries:
by Burton Burton
his Attys.

UNITED STATES PATENT OFFICE.

FRED RIES, OF CHICAGO, ILLINOIS.

PHONOGRAPHIC STYLUS.

1,222,139.

Specification of Letters Patent.

Patented Apr. 10, 1917.

Application filed April 10, 1916. Serial No. 90,102.

To all whom it may concern:

Be it known that I, FRED RIES, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have
5 invented new and useful Improvements in Phonograph-Styli, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

10 The purpose of this invention is to provide a stylus for transmitting sound vibrations from a phonograph record to the sound-reproducing diaphragm of the phonograph. The material of such a stylus should
15 be quite homogeneous and close grained so that the stylus will vibrate as a whole and be free from secondary internal vibration, and such material should also be adapted to wear well in frictional contact with the material of which phonograph records are
20 commonly made. These qualities I have discovered to a very satisfactory degree in the hard albuminous interior of the seed produced by the phytelephas palm. This palm
25 is found principally in Central and South America and its seeds grow in clusters of six to eight, each seed being of about the size of an Irish potato and consisting principally of a clear liquid which during the development of the seed solidifies into a soft
30 pulp and later into a very hard white form of albumin. If the seeds are gathered at this stage and the slight residue of oil dried out of them, the hard albumin can be worked
35 with cutting and grinding tools about as easily as soapstone. Though there is a slight grain or fiber usually running in the direction of the major axis of the seed the material is quite homogeneous and may be
40 worked up into very small pieces.

In the drawings:

Figure 1 illustrates a preferred form of stylus of this material mounted to cooperate with the phonograph sound box.

45 Fig. 2 is an enlarged perspective view of the stylus shown in Fig. 1.

Fig. 3 is a cross-sectional view of the same.

I prefer to form the stylus of this material as shown in the drawing. In Fig. 1

there is represented a phonograph sound
box, A, of conventional design and comprising a holder, B, in which the stylus, C, is removably mounted. In cross section the stylus is triangular, as indicated in Fig. 3, while one end is beveled at C¹, to form a
55 comparatively sharp point at C², for engagement with the phonograph record, D, carried on the rotary table, E. I find that when the stylus is made of the material above described it is sufficiently hard and
60 rigid to efficiently transmit vibration from the face of the record disk, D, to the sound box, while at the same time the material is softer than that of the record, and being
65 very close grained wears away in such a manner as to cause no injury to the record itself. This material is sometimes known as vegetable ivory but differs markedly from animal ivory in that it is much less brittle, so that if injured it does not tend to splinter
70 or fracture in a form which would injure a phonograph record; moreover, the vegetable ivory contains a certain quantity of vegetable oil which serves as a lubricant at the point of contact between the stylus and the
75 record, thus reducing the wear. This wear however is so gradual that a single stylus will satisfactorily play five or six records in succession before becoming too blunt, and at this stage a few strokes of a file over the
80 beveled end, C¹, will sharpen it for further service. This material is in commercial use for other purposes and therefore can be readily obtained in open market and at a
85 comparatively low price, thus adding the advantage of cheapness to a stylus manufactured from it.

I claim:—

1. As an article of manufacture, a phonograph stylus having its attenuated portion
90 formed of vegetable ivory.

2. As an article of manufacture, a phonograph stylus formed entirely of vegetable ivory.

In testimony whereof I have hereunto set
95 my hand at Chicago, Illinois, this 6th day of April, 1916.

FRED RIES.

ELECTRIC TELEPHONE TALKING MACHINE,
#1,222,348-----E. H. Amet,
Patented-April 10th, 1917.
Filed-July 17th, 1916.

E. H. AMET.
ELECTRIC TELEPHONE TALKING MACHINE.
APPLICATION FILED JULY 17, 1916.

1,222,348.

Patented Apr. 10, 1917.

Fig. 1

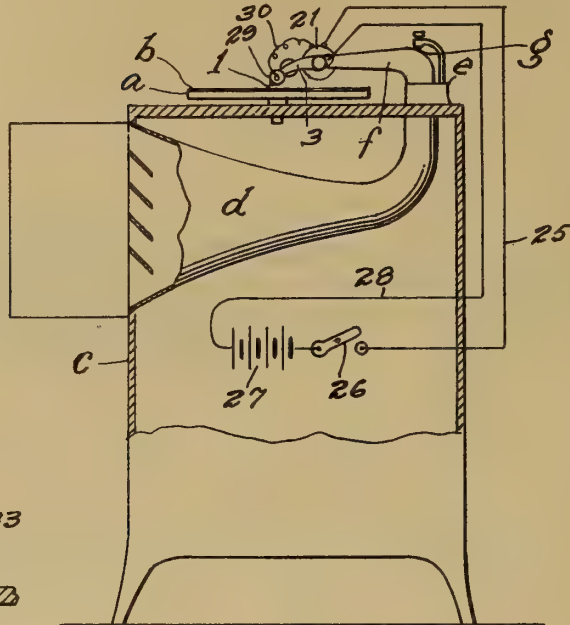


Fig. 4

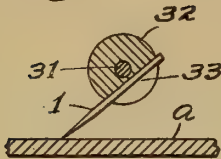


Fig. 3

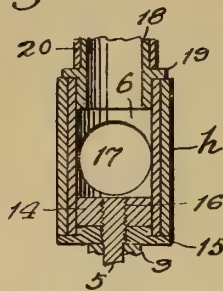
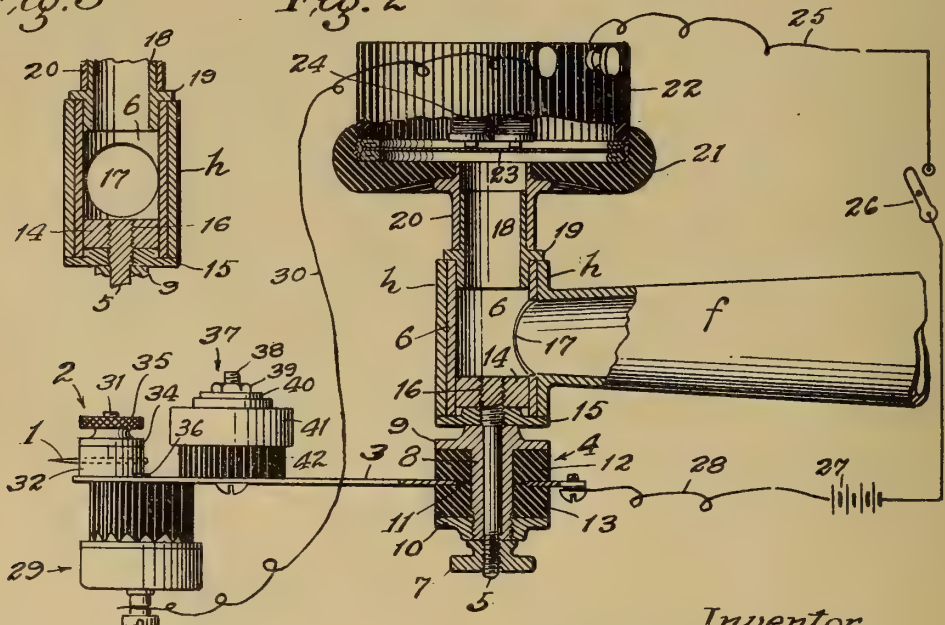


Fig. 2



Witness
C. C. Holly.

Inventor
Edward H. Amet
by James R. Townsend
his atty.

UNITED STATES PATENT OFFICE.

EDWARD H. AMET, OF REDONDO BEACH, CALIFORNIA.

ELECTRIC TELEPHONE TALKING-MACHINE.

1,222,348.

Specification of Letters Patent.

Patented Apr. 10, 1917.

Application filed July 17, 1916. Serial No. 109,816.

To all whom it may concern:

Be it known that I, EDWARD H. AMET, a citizen of the United States, residing at Redondo Beach, in the county of Los Angeles and State of California, have invented a new and useful Electric Telephone Talking-Machine, of which the following is a specification.

I regard this invention as pioneer and basic in that I provide the tone arm of a commercial talking machine with means for electrically reproducing sound records, thus utilizing the highly perfected sound amplifying means and constructions of cabinet talking machines now in use for amplifying the electrical reproductions.

An object of this invention is to produce a new and superior type of commercial talking machine; and the invention is applicable to various kinds of commercial talking machines now in common use; particularly to those using disk records and to those using cylinder records.

Heretofore talking machines of a commercial character have been provided with sound amplifying means comprising a tone arm and a horn, and vibrations are transmitted to the sound amplifying means through the medium of a sound box that is subjected to the mechanical vibrations of a style which contacts with a sound record device such as disk or cylinder having the sound record impressed thereon.

This invention is regarded as pioneer and basic in that I have produced a talking machine of commercial character comprising in combination a style for receiving and transmitting mechanical vibrations set up by the record of a sound record device, means for receiving said mechanical vibrations and translating them into electrical impulses, and means operated by said electrical impulses to produce sound waves, and propagate the same in the tone arm.

This invention is regarded as basic in that I have mounted upon the tone arm of a talking machine two translators, one of which is connected to a talking machine style and is mechanically actuated thereby and is adapted to translate the mechanical vibrations received therefrom into electrical

impulses; the other of said translators being connected to receive said electrical impulses and adapted and arranged to translate the same into sound-wave impulses and to deliver said sound wave impulses through its connections to the tone-arm.

That is to say, I have provided the tone arm with two translators and mountings or connections therefor whereby the impulses of the sound record are electrically translated and are conducted to the tone arm of the talking machine as sound wave impulses.

The invention is considered basic in that it provides means for combining with the talking machine tone arm, two electrical translators, one adapted for receiving the mechanical vibrations of the style and translating the same into electrical impulses, the other adapted for receiving such electrical impulses and translating them into sound wave impulses and delivering them as sound-waves to the tone-arm.

Sound records upon disk or cylinder record devices are impressed upon a surface so as to move the style with a to-and-fro motion, either laterally or up and down. It is well recognized that the record device transmits to the style vibrations in addition to those caused by the record and these latter extraneous vibrations are known as needle drag.

This invention is regarded as pioneer and basic in that I have produced a talking machine of commercial character comprising in combination, means for receiving and transmitting mechanical vibrations set up by a sound record device, means for receiving said mechanical vibrations and translating them into electrical impulses, means operated by said electrical impulses to produce sound waves, and means for amplifying said sound waves, all forming integral parts of a single compact talking machine.

I have provided an electric talking machine in which the electrical elements are carried by the tone arm in place of parts removed therefrom to give place to the mountings of said electrical elements.

An object of the invention is to provide a cheap, simple, compact talking machine which will produce from a sound record a

rendition in marked contrast with the renditions from present talking machines in superiority of tone, color, volume and volume control with minimum mechanical vibrations from sources other than the record.

An object of this invention is to provide means for converting the commercial type of talking machines into an electrical translating and sound-reproducing machine.

This new type of talking machine comprises in combination sound-amplifying means which may be of the usual character including a tone-arm and a horn, a telephone receiver carried by said sound-amplifying means and adapted to transmit sound waves to the sound-amplifying means, a style connected to sound-amplifying means, non-resonant means to prevent the transmission of mechanical vibrations from the style to the telephone receiver, an electrical transmitter connected to receive vibrations from the style and to translate the same into electrical impulses, and means connecting said electrical transmitter with the telephone receiver to operate the same by said electrical impulses.

In this invention a variable resistance electro-magnetic telephone system is introduced between the style and the tone arm of the well-known talking machine and bears the relation to a sound-record device that the ordinary sound box bears to the same in the art as heretofore known, wherever the sound box reproduces the mechanical movements of the style by proportionate air waves set up by the motion of the style applied mechanically to the diaphragm of the sound box.

In my present invention the vibrations set up by the style are translated into electrical impulses which are reproduced through the medium of an electro-magnetic receiver and by it transposed upon the air medium to produce the audible effect directly in the tone arm upon which it is mounted.

The advantage arising from the electro-magnetic translation and reproduction is that it is thus made possible to produce vibrations which would not otherwise have recognizable energy in the air reproduction and to magnify the same until they add their color value to the sound reproduction from the record.

An object of the invention is to provide a simple compact talking machine whereby sound can be produced from sound records with approximately natural tone and volume.

The action of the talking machine style when employed with a sound record and the electrical means, may be magnified to a desired magnitude so that the tone values of the recorded sound may be reproduced with true tone and approximately natural volume.

In this invention a microphone takes the direct vibration of the needle and the intensity of the electric impulse and the sound produced is in proportion to the energy applied to the style and may be of greater or less intensity in proportion to the intensity of the electric current applied.

Electro-magnets may be actuated by the current thus varied by the microphone, to reproduce a vibration set up by the style with either less volume than its actual movement would produce, or with as much greater volume as may be desired.

An object is to provide means whereby even when the reproduced sound is fine, it will have true color and tone; the tone being maintained throughout a complete range from the least volume to the greatest volume obtainable within the capacity of the transmitting microphone.

An object of this invention is to adapt the ordinary telephone receiver for the purpose of electrical reproduction of recorded sound waves.

Another object of the invention is to make provision whereby the tone arm of a talking machine of present types can be supplied with electrical reproduction means.

An object is to provide means whereby the vibrations of moving parts of the machine other than the style will not affect the sound record reproduction.

Other objects, advantages and features of novelty may appear from the accompanying drawings, the subjoined detail description and the appended claims.

In the accompanying drawings the invention will be shown with translators connected in primary circuit but it is obvious that they may be connected in any of the well known circuits commonly employed in the art.

My translator picks up the sound record vibrations of the style and magnifies the same without slurring. I provide means whereby a fine inexpensive talking machine will be made into an electrical machine without any added horns or cabinets.

The accompanying drawings illustrate the invention.

Figure 1 is a diagrammatic elevation illustrating a talking machine of the disk type constructed in accordance with this invention.

Fig. 2 is a plan partly in section of the tone translator, its mountings and connections and a fragment of the tone arm to which they are connected.

Fig. 3 is a fragmental section of the T fitting bearing and valve construction with its connections.

Fig. 4 is a sectional detail of the style holder with style.

The talking machine shown is provided with the usual turn-table *a* to rotate the

record disk *b* and mounted upon the usual cabinet *c* containing the built-in sound amplifying means or horn *d*.

It is understood that the turn-table is operated by the usual motor contained in the cabinet and not shown in the drawings. Said cabinet is also provided with the usual tone arm support *e* in which the talking machine tone arm *f* is pivotally mounted in the usual way on a vertical axis at *g*.

Said tone arm is also provided with the usual head *h* which is simply a T fitting, the stem of which opens into the small end of the usual taper bore of the tone arm.

The reproducing style 1 is connected by non-resonant style holder or clamping means 2 with a style arm 3 that is pivotally connected to the tone arm *f* by the non-resonant hub 4 that is rotatably mounted on stud 5 which is connected to a tubular mounting 6 that is carried by the T head *h* of the tone arm.

Said hub 4 is secured in position on stud 5 by a thumb nut 7 and comprises a sleeve 8 having a flange 9 at one end and threaded at the other end to receive a flange nut 10.

The style arm 3 as shown is a strip of sheet steel or other suitable material having a hole 11 to receive and considerably larger than the sleeve 8. Said arm is adjustably and non-resonantly supported on the sleeve 8 by means of soft india rubber washers 12, 13 mounted on said spindle on opposite sides of the arm 3 and clamped thereto by a flange nut 10. A thumb-nut 7 is screwed onto the spindle 5, and by tightening said thumb-nut the sleeve is mounted friction tight against the spindle support, which is formed of the inner and outer nuts 14, 15, locked together on a threaded portion 16 of the spindle, the inner nut 14 fitting tightly inside the mounting 6 which is provided with a lateral orifice 17 to serve as a lateral valve port cooperating with the tone-arm walls to limit the cross-sectional area of the passage into the small end of the tone-arm.

The outer nut 15 is provided with a flange to fit against the end of the T head which forms a bearing *h*, and the nut 14 fits tightly inside the valve member 6, so that the style arm 3 is firmly connected to and supported by the bearing *h* of the talking machine tone-arm *f*. A tubular flanged coupling 18 is tightly fitted in the tubular mounting 6 so as to rotate the same; the flange 19 of said coupling abutting against the end of said mounting and the T head to position the mounting in the head.

The telephone receiver tube 20 is mounted on the outer end of the bushing 18 and abuts against the flange 19. Means consisting of a rotatable bearing having a valve-like movement for regulating the area of an opening into the sound-conducting arm of the talking machine are thus provided for

mounting the sound-reproducing means or telephone receiver on the tone-arm. I have thus formed a valve control between the sound-reproducing means and the tone arm.

Upon the telephone receiver tube 20 is mounted the telephone receiver housing 21 upon which is mounted a telephone receiver 22 of approved type. Said receiver 22 includes the usual diaphragm 23 and the electro-magnet 24 for operation thereof; said magnet being in the electric circuit comprising the lead 25, switch 26, battery 27, lead 28, tone-arm 3, variable resistance electrical telephone transmitter 29, and the lead 30. Said telephone transmitter 29 is directly actuated by the reproducing style traveling in the record groove. Said resistance 29 may be mounted on the tone-arm in any suitable manner well-known in the art, and one method of mounting the same is illustrated in my co-pending application for dead beat balanced electrical transmitter, Serial No. 82,266, filed in the United States Patent Office Mar. 4, 1916. Means are provided for operatively connecting a telephone system and the style of the talking machine with sound-amplifying means.

The non-resonant style holder and clamping means 2 comprises a stud 31 fixed to the tone-arm 3 and a non-resonant style holder or mounting 32 provided with a slanting style seat 33 therein and compressed by a washer 34 mounted on, and a thumb-nut 35 screwed onto said stud 31. Said non-resonant mounting is connected to the style. The seat 33 may be made either by an awl hole through the support 32 or by a slit from one side a considerable depth into the support, so that when said style is inserted as shown in Fig. 4 and the nut 35 screwed home, the style will be firmly clamped at the desired angle.

The variable resistance 29 is mounted on a conducting stud 36 between the stud 31 and the arm-supporting sleeve 8 and close to the free end of the style arm 3, thus forming a moderate weight projecting from the flat tone-arm on the side opposite the style holder or clamping means 2. A non-resonant vibration stop or absorbing weight 37 is applied to the style arm 3 on the side thereof opposite the variable resistance 29. Said vibration stop is mounted on the style arm by a bolt 38, nut 39 and washer 40, and consists of a weight 41 made of lead or some other suitable material and a non-resonant washer 42 interposed between the weight 41 and the arm 3.

The telephone receiver is acoustically connected to the tone arm by the tube 20, the coupling 18 and the tubular mounting 6.

In practical operation the vibrations transmitted by the record to the record actuated style 1 produces in the variable resistance 29 variations which are effective upon

the electro-magnet 24 and operate the telephone diaphragm 23, thus producing sound wave impulses in the hollow sound wave or impulse conductor formed by the parts 20, 18, 6, and *f*. The telephone receiver 22 is thus connected to deliver sound wave impulses to said sound wave impulse conductor. The sound wave impulses are transmitted through the port 17 of the bearing 6 when said bearing is turned to cause the port 17 to register with the bore of the tone-arm. The telephone receiver being thus connected and operated by the record actuated style, delivers sound wave impulses into said sound wave conductor.

It is thus seen that means carried by the tone-arm are connected to actuate the telephone receiver also carried by the tone-arm to set up sound impulses in said conductor and to transmit them through the tone-arm, and that I have produced in a talking machine a telephone system in operable connection with the tone-arm thereof.

The opening 17 is susceptible of adjustment in relation to the opening into the tone-arm for proportioning the sound wave passage for the regulation of the sound reproduction.

By rotating the telephone receiver and thus turning the tubular mounting 6 the passage through the port 17 into the tone-arm *f* may be reduced and enlarged by these mechanical means as desired to give the full volume of the sound impulses set up by the diaphragm or to modify the same as may be required.

The volume of sound impulses set up in the tone arm will depend upon the amount of energy in the translating electric circuit.

I have thus produced the combination with means for reproducing sound wave vibrations of means for accurately translating the same into an undulatory electric current corresponding to the original sound wave impulses, and moreover have provided in combination therewith, an arrangement by which the sound wave impulses are delivered into the tone-arm of the talking machine.

I claim:—

1. The combination with a talking machine tone arm and a style connected thereto, of an electrical transmitter connected to

and carried by the style and tone arm and arranged to receive impulses from the style; a telephone receiver mounted on and carried by said tone arm and acoustically connected to the tone arm; and electrical connections connecting the electrical transmitter with the telephone receiver.

2. In an electrical telephone talking machine the combination with a style arm; of a style mounting thereon; a style carried by said mounting; a telephone transmitter on said style arm; a support for one end of said style arm, the other end of said arm being free, and a weight non-resonantly mounted on the style arm between the style and the support.

3. In an electrical telephone talking machine the combination with a style arm; of a style mounting thereon; a style carried by said mounting; a telephone transmitter on said style arm; a support for one end of said style arm, the other end being free, and a weight non-resonantly mounted on the style arm between the style and transmitter on the one side of said weight, and the support on the other side.

4. In an electrical telephone talking machine, a style arm; non-resonant means for supporting one end of said style arm, the other end of said arm being free; and a style at the free end of the style arm, a telephone transmitter at the free end of the style arm; and a non-resonantly mounted weight on the style arm between said style and transmitter on the one hand, and the non-resonant support on the other hand.

5. The combination with a tone-arm, of a telephone receiver carried by said tone-arm, means to transmit sound-wave impulses from said receiver to said tone-arm, a style arm connected to said tone-arm and having a free end; a style at the free end of the style arm; a telephone transmitter at the free end of the style arm; and a weight between the transmitter and style on the one hand and the style arm support on the other hand.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 12th day of July, 1916.

EDWARD H. AMET.

Witness:

JAMES R. TOWNSEND.

TALKING MACHINE,
#1,222,371-----J.C.English,
Patented-April 10th, 1917.
Filed-Sept. 4th, 1907.
Renewed-February 5th, 1912.

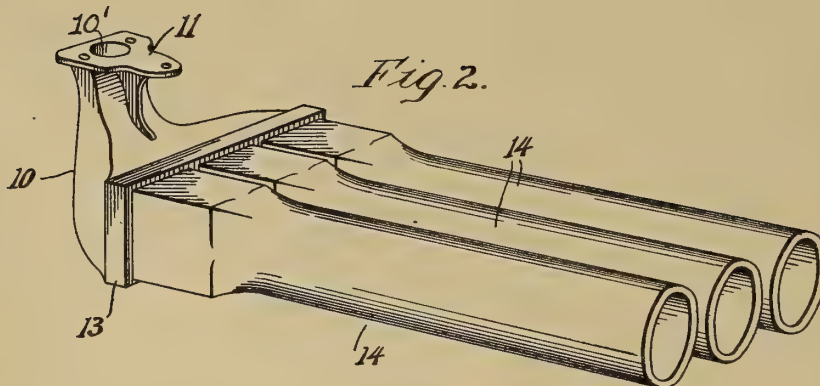
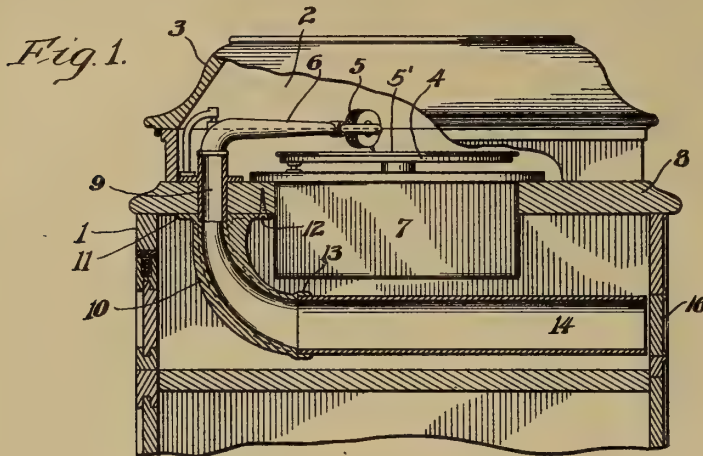
J. C. ENGLISH.
TALKING MACHINE.

APPLICATION FILED SEPT. 4, 1907. RENEWED FEB. 5, 1912.

1,222,371.

Patented Apr. 10, 1917.

2 SHEETS—SHEET 1.



WITNESSES

W. G. Hartman.

A. S. Gardner.

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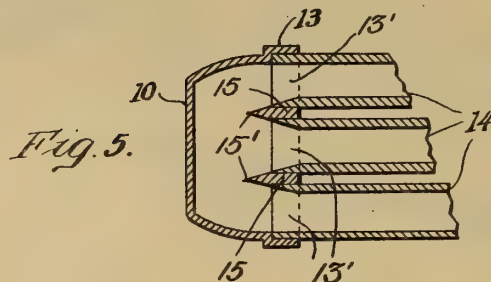
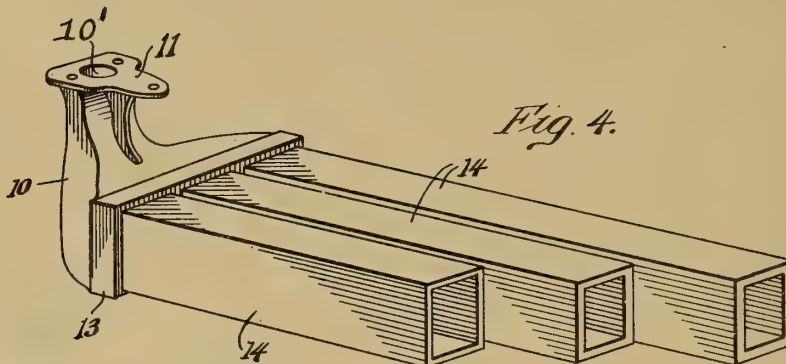
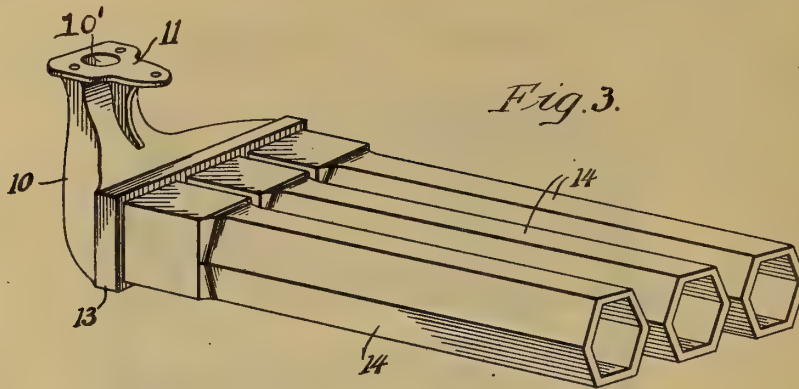
J. C. ENGLISH.
TALKING MACHINE.

APPLICATION FILED SEPT. 4, 1907. RENEWED FEB. 5, 1912.

1,222,371.

Patented Apr. 10, 1917.

2 SHEETS—SHEET 2.



WITNESSES

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TALKING-MACHINE.

1,222,371.

Specification of Letters Patent.

Patented Apr. 10, 1917.

Application filed September 4, 1907, Serial No. 391,399. Renewed February 5, 1912. Serial No. 675,646.

To all whom it may concern:

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, and a resident of the city of Camden, county of Camden, and State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

The main objects of this invention are to provide in a talking machine improved sound amplifying means; and to provide other improvements as will appear hereinafter.

In the accompanying drawings Figure 1 is a fragmentary side elevation partly in vertical longitudinal section of a talking machine constructed in accordance with this invention; Fig. 2 is a perspective of a sound amplifier constructed in accordance with this invention; Figs. 3 and 4 are perspective views of two different forms of sound amplifiers constructed in accordance with this invention; and Fig. 5 is a longitudinal horizontal section of a sound amplifier constructed in accordance with this invention.

Referring to the drawings, one embodiment of this invention comprises a cabinet 1 provided at the upper end thereof, with a top compartment 2 inclosed by a hollow cover 3. The top compartment 2 contains a rotary record support or turntable 4, a sound box or sound reproducer 5 arranged to cooperate with a sound record 5' on the record support 4, and a hollow tapering tone arm or sound box arm 6 connected at its smaller end to, and communicating with, the sound box 5. The tone arm 6 is mounted to swing with the sound box 5 across the record support 4 about a vertical axis extending through the larger end of the tone arm. The larger end of the tone arm 6 turns downwardly and communicates with the upper end of a sleeve 9 passing snugly and fixedly through a partition 8 forming the floor of the top compartment 2 of the cabinet, the axis of oscillation of the tone arm 6 being coincident with the longitudinal axis of the sleeve 9.

For amplifying the sounds delivered from the sound box 5 through the tone arm 6 and sleeve 9, there is arranged within the cabinet, below and extending downwardly from the floor 8 of the top compartment of the cabinet, a hollow longitudinally curved rigid bracket 10. The upper end of this

bracket 10 is provided with a circular inlet 10', which registers and communicates with the lower end of the sleeve 9, and the upper end of the bracket is also provided with a flat horizontal flange 11 integral or rigid therewith and rigidly secured to the under side of the partition 8 by means of screws 12, or in any other suitable manner.

The bracket 10 flares downwardly and forwardly from its upper end and terminates in a transversely oblong substantially rectangular lower end 13, provided with a plurality of spaced openings or outlets 13' communicating with the interior of the bracket and forming sockets in which are secured the inner ends respectively of a plurality of tubes or resonators 14 which are entirely supported by the bracket 10, and which project freely in the interior of the cabinet from the bracket. These tubes or resonators 14 taken together with the bracket 10 form a sound amplifier.

The longitudinal opening through the bracket 10 increases gradually downwardly in transverse sectional area and changes gradually from the circular shape of the inlet 10' to the oblong rectangular shape of the interior of the lower or outlet end of the bracket. The outlets 13' of the bracket are preferably rectangular and substantially square in outline, forming sockets which are substantially identical in size and form and which are preferably arranged in horizontal alinement. The portions 15 of the bracket between the outlets 13', and the adjacent portions of the inner surfaces of the walls of the resonators 14, preferably converge inwardly and terminate respectively in sharp substantially vertical edges 15', arranged to facilitate the entrance of sound waves into the resonators 14.

The tubes or resonators 14 may be circular in cross section, as shown in Fig. 2, or hexagonal as shown in Fig. 3, or rectangular or square, as shown in Fig. 4; or any other desirable shape in transverse section through the major portion of their lengths, and may be of substantially equal lengths, as shown in Fig. 2, or of unequal lengths, as shown in Figs. 3 and 4, and may have sides or walls either of uniform thickness, as shown in Figs. 2 and 3, or of different thicknesses, as shown in Fig. 4, as may be preferred for any particular purpose.

It is to be understood that this invention

is not limited to any particular material for constructing the tubes or resonators 14, although tubes or resonators which are made of such material that the sides of the tubes
 5 will vibrate when in operation have been found to produce good results.

In the various forms of amplifiers constructed in accordance with this invention, the inner ends of the tubes or resonators 14
 10 are preferably exteriorly identical in construction and adapted to fit in sockets of uniform sizes, so that any of the several forms of tubes may be used with one type of bracket 10, thus permitting any desired
 15 combination of tubes with a single type of bracket.

From the foregoing it is evident that an amplifier may be constructed in accordance with this invention by combining the bracket
 20 10 hereinbefore described either with a series of similar tubes of like material, or of different materials, or by combining the bracket 10 with a plurality of tubes of various shapes and of various or like materials.
 25 It has been found that when a plurality of tubes or resonators are used simultaneously, as hereinbefore described, in an amplifier for the sounds transmitted from the sound reproducer of a talking machine, the
 30 tubes or resonators supplement each other in acting on the complex tones and over tones transmitted from the reproducer, and tones or over tones which might be unaffected or subordinated in one of the tubes, are ap-
 35 parently taken up and acted on by some other tube or tubes, and that all of the tubes thus working together will give a pleasing round full mellow quality to the reproduced sounds.

40 Having thus described my invention, what I claim and desire to protect by Letters Patent of the United States is:

1. In a talking machine, the combination with an amplifier comprising a hollow stationary sound conveying bracket of relatively non-vibratory construction provided
 45 with an opening at one end and a plurality of openings at its other end, of a sound box communicating with said first mentioned opening and a plurality of spaced resonators communicating with the said plurality of
 50 openings respectively.

2. In a talking machine, the combination with an amplifier comprising a hollow stationary sound conveying bracket of relatively non-vibratory construction having an opening at one end and a series of openings
 55 at its other end forming sockets, of a series of spaced resonators wholly supported in said sockets, and a sound box communicating with the opening in the other end of said bracket.

3. In a talking machine, the combination with an amplifier comprising a hollow stationary sound conveying bracket of rela-

tively non-vibratory construction having an opening at one end and a series of openings at its other end forming sockets, of a series of spaced tubes wholly supported in said
 70 sockets, and a sound box communicating with the opening in the other end of said bracket.

4. In a talking machine, the combination with a sound reproducer, of an amplifier comprising a rigid hollow bracket of relatively non-vibratory construction having one
 75 end communicating with said reproducer and flaring from said end, and a plurality of independent tubular resonators communicating with the other end of said bracket.
 80

5. In a talking machine, the combination with a cabinet, of a rigid hollow non-vibratory bracket rigidly secured to said cabinet and depending downwardly therein, said
 85 bracket being provided with an inlet at its upper end, and the lower end of said bracket being substantially oblong transversely, a sound reproducer communicating with the upper end of said bracket through
 90 said inlet, and a plurality of resonators communicating with the lower end of said bracket.

6. In a talking machine, the combination with a cabinet, of a rigid hollow non-vibratory bracket rigidly secured to said cabinet and depending downwardly therein, said
 95 bracket being provided with an inlet at its upper end, and the lower end of said bracket being substantially oblong transversely, a sound reproducer communicating with the upper end of said bracket through said inlet,
 100 and a plurality of resonators communicating with the lower end of said bracket, said resonators being arranged in a substantially horizontal plane.
 105

7. In a talking machine, the combination with a cabinet, of a hollow non-vibratory bracket depending downwardly in said cabinet, a sound reproducer communicating
 110 with the upper end of said bracket, and a plurality of independent tubular resonators communicating with the lower end of said bracket and extending in substantially parallel relation.
 115

8. In a talking machine, the combination with a cabinet, of a hollow non-vibratory bracket extending downwardly in said cabinet, a sound reproducer communicating with
 120 the upper end of said bracket, and a plurality of independent tubular sound resonators communicating with the lower end of said bracket and extending in substantially parallel relation, said tubular resonators being arranged in a substantially horizontal
 125 plane.

9. In a talking machine, the combination with sound reproducing means, of a sound amplifier communicating therewith and comprising a rigid hollow non-vibratory
 130 bracket, and a plurality of independent

tubular wooden resonators communicating with said bracket.

10. In a talking machine, the combination with a sound amplifier comprising a hollow sound conveying member provided with an inlet and with a plurality of outlets, of sound reproducing means arranged to deliver sound into said inlet, and a plurality of spaced hollow members each composed of vibratory elements, the generatrix of the sides of which is parallel to the axis of said member, said hollow members being arranged to amplify sounds received from said outlets.

11. In a talking machine, the combination with an amplifier comprising a hollow non-vibratory sound conveying member provided with an inlet and a plurality of outlets communicating with said inlet, of sound reproducing means arranged to deliver sound into said inlet, and a plurality of substantially parallel resonators arranged in substantially the same plane to receive sounds from said outlets.

12. In a talking machine, the combination with an amplifier comprising a hollow non-vibratory sound conveying member provided with an inlet and a plurality of outlets communicating with said inlet, of sound reproducing means arranged to deliver sound into said inlet, and a plurality of substantially parallel resonators arranged in substantially the same plane to receive sounds from said outlets, said resonators being entirely supported by said hollow member.

13. In a talking machine, the combination with a sound amplifier comprising a rigid hollow substantially non-vibratory stationary sound conveying member provided with an inlet and with a plurality of outlets, of sound reproducing means arranged to deliver sound into said inlet, and a plurality of spaced stationary hollow vibratory members arranged to receive sounds from said outlets.

14. In a talking machine, the combination with a sound amplifier comprising a hollow sound conveying member provided with an inlet and with a plurality of outlets arranged in substantially the same plane, of sound reproducing means arranged to deliver sound into said inlet and a plurality

of spaced hollow tubes of uniform bore arranged to receive sounds from said outlets. 55

15. In a talking machine, the combination with sound reproducing means, of sound amplifying means communicating therewith and comprising a hollow non-vibratory longitudinally flaring bracket having a sound inlet provided at its smaller end and having its larger end oblong in transverse section with its major transverse axis considerably greater than its minor transverse axis, and said larger end being provided with a plurality of outlets arranged in a series extending in the direction of the major transverse axis of said end, and a plurality of hollow members communicating with said outlets respectively. 70

16. In a talking machine, the combination with sound reproducing means, of sound amplifying means communicating therewith and comprising a hollow non-vibratory longitudinally flaring bracket having a sound inlet provided at its smaller end and having its larger end oblong in transverse section with its major transverse axis considerably greater than its minor transverse axis, and said larger end being provided with a plurality of outlets arranged in a series extending in the direction of the major transverse axis of said end, and a plurality of spaced parallel hollow members communicating with said outlets respectively. 85

17. In a talking machine, the combination with an amplifier comprising a hollow non-vibratory sound conveying member provided with an inlet and a plurality of outlets communicating with said inlet, of sound reproducing means arranged to deliver sounds into said inlet, and a plurality of substantially parallel resonators arranged in substantially the same plane to receive sounds from said outlets, said resonators having delivery ends opening in the same general direction. 95

In witness whereof I have hereunto set my hand this 3rd day of September, A. D. 1907. 100

JOHN C. ENGLISH.

Witnesses:

A. I. GARDNER,
ALEXANDER PARK.

TALKING MACHINE,
#1,222,372-----J. C. English,
Patented-April 10th, 1917.
Filed-March 24th, 1911.

Patented Apr. 10, 1917.

This diagram illustrates a complex mechanical assembly, possibly a pump or engine component, shown in a cross-sectional view. The device is housed within a main chamber (32) and is supported by a base (7) with feet (9). Key components include a piston rod (30) connected to a piston (25) at the top, a large gear (20) inside the chamber, and various internal mechanisms like valves (16, 18) and a spring (19). The diagram is labeled with numerous numbers (1-52) indicating specific parts and features.

ATTORNEY

UNITED STATES PATENT OFFICE.

JOHN C. ENGLISH, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

TALKING-MACHINE.

1,222,372.

Specification of Letters Patent.

Patented Apr. 10, 1917.

Application filed March 24, 1911. Serial No. 616,663.

To all whom it may concern:

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, and a resident of the city of Camden, county of Camden, and State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

The main objects of this invention are to provide an improved talking machine of simple and compact construction; to provide in a talking machine an improved cabinet; improved sound amplifying means; an improved support for a swinging tone arm and for sound amplifying means; and to provide other improvements as will appear hereinafter.

In the accompanying drawings Figure 1 is a fragmentary side elevation partly in vertical central section of a talking machine constructed in accordance with this invention and Fig. 2 a slightly enlarged fragmentary perspective of a portion of the same.

Referring to the drawings, one embodiment of this invention comprises a substantially rectangular cabinet or inclosure including a top horizontal wall 2, parallel vertical side walls 3 and 4 secured to and extending downwardly from the top wall, a vertical back wall 5 connecting the rear edges of the side walls, and a vertical front wall 6 connecting the front edges of the side walls. These walls of the cabinet are preferably made of wood and are comparatively thick, as is usual in similar cabinets to protect the inclosed mechanism.

The major portion of the bottom of this cabinet is formed by a comparatively thin substantially horizontal and rectangular sounding-board 7, the edges of which are secured in any suitable manner in horizontal recesses 8 provided therefor in the vertical walls of the cabinet.

The cabinet is mounted upon the usual or any suitable spaced supports 9 depending from the lower edges of the vertical walls of the cabinet. These supports 9 keep the lower horizontal edges of the vertical walls of the cabinet spaced above any flat base upon which the cabinet may happen to be mounted and permit sound waves to be transmitted from the bottom sounding-board 7 outwardly through the spaces between the lower

edges of the vertical walls of the cabinet and the base.

Arranged above the top wall 2 of the cabinet is the usual horizontal turn-table 15, which is mounted to rotate upon the upper end of a vertical spindle 16 which extends rotatively through an aperture 17 provided therefor in the top wall. The spindle 16 is mounted to rotate in suitable bearings carried by a horizontal plate 18 depending from a removable central portion 19 of the top wall 2.

Suitable actuating mechanism 20 is arranged within the cabinet, preferably depending from the plate 18 and is operatively connected to the spindle 16 for rotating the same.

Arranged above the turn-table 15 is a sound box or sound reproducer 25 of any well-known or suitable construction and adapted to carry a stylus 26 arranged to co-operate with a sound record 27 mounted upon the turn-table.

The sound box 25 is connected in any well-known or suitable manner to the free end of a tone arm 30 with which it communicates, the sound box being movable with respect to the tone arm vertically toward or away from the turn-table.

The tone arm 30 preferably tapers toward its free end, and the larger end 31 of the tone arm is turned downwardly and is mounted upon and communicates with the upper end of a hollow substantially cylindrical elongated vertical extension 32 of a hollow bracket 33, the upper end of the extension being preferably slightly above the upper surface of the top wall 2 of the cabinet. The tone arm is restrained by any well-known or suitable means to swing in a fixed horizontal plane about a vertical axis coincident with the longitudinal axis of the extension 32. The hollow bracket 33 is preferably a unitary structure preferably made of cast iron or other similar material and having comparatively thick and rigid walls.

The major portion of the hollow bracket 33 is inclosed by the cabinet and is provided on its rear side with a base plate 34 integral or rigid therewith and having a flat vertical rear surface which is rigidly clamped to the inner surface of the rear wall 5 of the cabinet by means of screws 35 extending through

the rear wall of the cabinet and threaded into the base plate, or by any other suitable means.

The vertical extension 32 of the hollow bracket 33 projects from the interior of the cabinet freely through an aperture 36 provided therefor in the top wall 2 adjacent the rear wall 5 and substantially midway between the side walls 3 and 4 of the cabinet. 10 The lower portion of the hollow bracket 33 preferably flares downwardly and then forwardly in the form of a curved elbow 37 substantially rectangular in cross section and terminates in an enlarged flanged end 15 38 integral therewith and the walls of which preferably diverge forwardly and form a hollow socket.

For amplifying the sound waves transmitted forwardly through the hollow bracket, 20 three sounding-boards 45, 46 and 47 are arranged within the cabinet extending forwardly from the bracket. These sounding boards are secured at their inner ends within the socket 38 of the bracket by screws 48 extending through the socket or by any other 25 suitable means, and are entirely supported thereby. Two of these boards, 45 and 46, are oppositely arranged in vertical forwardly diverging planes, the lower edges of these 30 boards being spaced substantially parallel to and comparatively near to the horizontal sounding-board 7 forming the bottom of the cabinet, and the upper edges of these boards being inclined upwardly in a forward direc- 35 tion. The third sounding board, 47, connects and is secured to the upper edges of the vertical sounding boards 45 and 46 and extends beneath the actuating mechanism 20. The front end edges of these three sounding- 40 boards are in a vertical plane parallel to and spaced slightly within the inner surface of the front wall 6 of the cabinet.

The front wall 6 of the cabinet is provided with a substantially rectangular opening 50 45 similar in shape and substantially equal in area to and horizontally opposite, the rectangular area inclosed by the front end edges of the three sounding-boards 45, 46 and 47. The opening 50 may be provided 50 with one or more doors 51 hinged as at 52 to swing outwardly.

The three sounding-boards 45, 46 and 47 within the cabinet form a three-sided longitudinally tapering channel, conduit or 55 sound amplifying device substantially in the form of a rectangular inverted U in cross section and having its open side facing toward the horizontal sounding-board 7 forming the bottom of the cabinet.

60 It is thought that the mode of operation of this device will be fully understood from the foregoing description.

Having thus fully described this invention, I claim and desire to protect by Letters Patent of the United States:

1. A talking machine comprising a cabinet including a sounding board forming an exterior wall thereof, and hollow sound amplifying means arranged within said cabinet and having that side facing toward 70 said board spaced from said board and open substantially throughout its length, said amplifying means being also provided with an open delivery end.

2. A talking machine comprising a sounding-board, and hollow sound conducting means having an open side facing toward 75 and spaced from said board and an open delivery end.

3. A talking machine comprising a compartment, including an upwardly extending front wall provided with an outlet, an upwardly extending back wall, a top wall, and a sounding-board forming the major portion of the bottom of said compartment, 85 actuating means carried by said top wall, hollow sound conducting means extending within said inclosure and secured to and entirely supported by said back wall and extending freely through said top wall, and 90 sound reproducing means arranged above said top wall and communicating with said sound conducting means.

4. A talking machine comprising an inclosure, including a sounding-board forming 95 a part of the exterior thereof, hollow sound conducting means having a delivery and projecting freely within said inclosure and spaced from said sounding-board and arranged to deliver sound waves in a direction substantially parallel to said sounding- 100 board, and having an opening in a longitudinal side thereof arranged to direct sound waves against said sounding-board, sound reproducing means arranged outside of said 105 inclosure and communicating with said sound conducting means, a rotary record support arranged outside of said inclosure to cooperate with said sound reproducing means, and actuating mechanism for said 110 support arranged within said inclosure but outside of said sound conducting means.

5. A talking machine comprising a cabinet providing a compartment having a top wall, and a sounding-board forming a bottom wall thereof, a rotary record support arranged above said top wall and carried thereby, actuating means for said support depending from said top wall in said compartment, sound reproducing means arranged above said support, a rigid sound conveyer secured to said cabinet, independently of said top wall, and extending substantially from the plane of said top wall and into proximity with said sounding- 125 board, said sound conveyer communicating at its upper end with said sound reproducing means, and sound amplifying means, including a sounding-board, arranged to receive sound waves from the lower end of 130

said sound conveyer, and arranged to deliver sound waves directly against said first mentioned sounding-board, and also directly through an outlet provided therefor in said cabinet.

6. In a talking machine, the combination with a sounding-board, of hollow sound amplifying means substantially U-shaped in transverse section, the open side of said amplifying means facing said sounding-board.

7. In a talking machine, the combination with a sounding-board, of hollow sound conducting means spaced therefrom and having an open longitudinal side facing and in close proximity to said board and bounded by walls having edges extending substantially parallel to said board.

8. In a talking machine, the combination with a sounding-board, of hollow sound conducting means spaced therefrom and having an open longitudinal side facing and in close proximity to said board and bounded by walls having edges extending substantially parallel to said board and having an open end facing in a different direction, said open side having an area greater than said open end.

9. In a talking machine, the combination with a sounding-board, of hollow sound conducting means spaced therefrom and hav-

ing an open longitudinal side facing and in close proximity to said board and bounded by walls having edges extending substantially parallel to said board and having an open end facing in a different direction, said open side having an area greater than said open end, and said sounding-board extending over the entire area of said open side.

10. A talking machine comprising a compartment including a sounding board forming an exterior wall thereof, hollow sound conducting means having an open delivery end projecting freely within said compartment, a tone arm arranged outside of said compartment and communicating with and entirely supported by said sound conducting means, sound reproducing means communicating with said tone arm, a rotary record support arranged outside of said compartment to cooperate with said sound reproducing means, and actuating mechanism for said support arranged within said compartment but outside of said sound conducting means.

In witness whereof, I have hereunto set my hand this 17th day of March, A. D., 1911.

JOHN C. ENGLISH.

Witnesses:

FRANK B. MIDDLETON, Jr.,

CHARLES F. WILLARD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

TALKING MACHINE RECORD,
#1,222,381-----E.T.Frankel,
Patented-April 10th, 1917.
Filed-March 22nd, 1916.

E. T. FRANKEL.
TALKING MACHINE RECORD.
APPLICATION FILED MAR. 22, 1916.

1,222,381.

Patented Apr. 10, 1917.

Fig. 1,

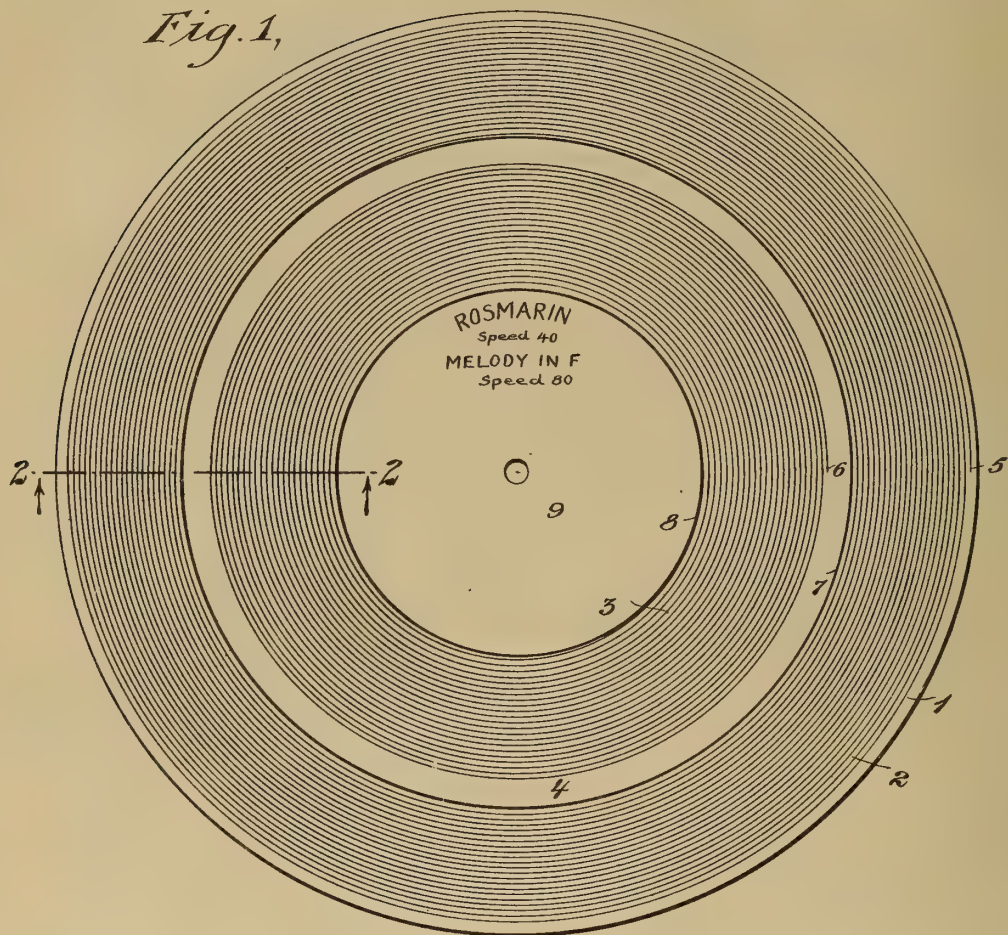
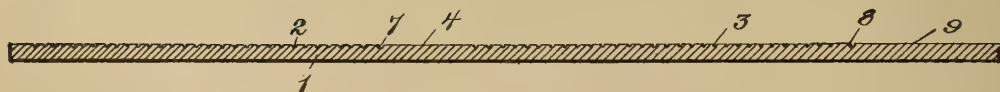


Fig. 2.



WITNESSES

Edw. Thorpe
Bradway

INVENTOR

E. T. Frankel
BY *Munn & Co*
ATTORNEYS

UNITED STATES PATENT OFFICE.

EDWARD T. FRANKEL, OF NEW YORK, N. Y.

TALKING-MACHINE RECORD.

1,222,381.

Specification of Letters Patent. Patented Apr. 10, 1917.

Application filed March 22, 1916. Serial No. 85,923.

To all whom it may concern:

Be it known that I, EDWARD T. FRANKEL, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Talking-Machine Record, of which the following is a full, clear, and exact description.

This invention relates to disk records for talking machines, and has for its general object to improve the record in a simple and inexpensive manner so as to increase the effective record space or the duration of the sound reproduction for a given area.

A more specific object of the invention is the provision of a plurality of concentric record grooves which are acoustically unrelated and each is a separate piece, and the pieces are recorded and reproduced at different rotative speeds, but the rotative speed of each piece is uniform throughout, and consequently within a given area a larger number of sound undulations can be obtained than the maximum possible with the ordinary records, as can be mathematically demonstrated, and on each disk will be the titles of the pieces and the speeds at which they are to be reproduced, so that the user can, by adjusting the speed regulator of the machine, play the pieces at the proper speeds. Each piece ends in a circular groove so that it is impossible for the needle to pass from the groove of one piece to the groove of the adjacent piece, and the smooth space between the grooves will guide the user in properly placing the needle for the desired selection.

With such objects in view, and others which will appear as the description proceeds, the invention comprises various novel features of construction and arrangement of parts which will be set forth with particularity in the following description and claims appended hereto.

In the accompanying drawing which illustrates one embodiment of the invention and wherein similar characters of reference indicate corresponding parts in both the views,

Figure 1 is a plan view of the record disk; and

Fig. 2 is an enlarged sectional view on the line 2-2, Fig. 1.

Referring to the drawing, the disk 1 is

made in the usual manner, except as far as the record grooves are concerned. One or both faces of the disk has a plurality of record grooves 2 and 3 occupying different concentric portions or areas of the disk. The groove areas are separated by a narrow smooth surface 4, so that it is impossible for the needle or stylus to pass automatically from the finishing end of one groove to the beginning of the next groove. In the present instance the beginnings 5 and 6 of the record grooves 2 and 3 are outermost, so that the needle will travel inwardly as the record plays; and the inner ends of the grooves terminate in deep circular grooves 7 and 8, so that the needle will remain engaged in the grooves if the record continues to rotate after the end of the piece is reached, and thus there is no danger of the needle passing from the record groove 2 to the record groove 3. The central space 9 is utilized for advertising purposes in the usual manner and also for bearing the titles of the pieces on the record, and associated with each title is the notation of the speed at which the disk should turn for the reproduction of such piece, as indicated in Fig. 1. The sound vibrations of the inner record groove are recorded at a higher rotative speed than that required for the outer record, so that within a comparatively small area a piece of considerable length can be recorded, and as a result, two or more complete pieces can be recorded in the area usually employed for a single piece, according to the common method of sound recording and reproduction. It is to be understood that although only two record grooves are shown, the number may be varied, and furthermore, the grooves may be reversely arranged to those shown, so that the needle will travel outwardly. The record differs from that type of disk records which has a plurality of sound grooves for the simultaneous reproduction of sound by reproducers operating in connection with the respective grooves.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A disk record having separate concentric portions provided with sound grooves recorded at different rotative speeds.

2. A disk record having spiral sound rec-

ord grooves occupying different concentric portions on the face of the disk, there being an ungrooved circular portion on the face between the grooved areas, the said grooves
5 being recorded at different rotative speeds, and the rotative speed for each groove being maintained uniform from beginning to end.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWARD T. FRANKEL.

Witnesses:

C. BRADWAY,

PHILIP D. ROLLHAUS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

AUTOMATIC STOP FOR SOUND
REPRODUCING MACHINES,
#1,222,408-----O.H.Karch,
Patented-April 10th, 1917.
Filed-July 24th, 1912.
Renewed-September 19th, 1916.

O. H. KARCH.
 AUTOMATIC STOP FOR SOUND REPRODUCING MACHINES.
 APPLICATION FILED JULY 24, 1912. RENEWED SEPT. 19, 1916.

1,222,408.

Patented Apr. 10, 1917.

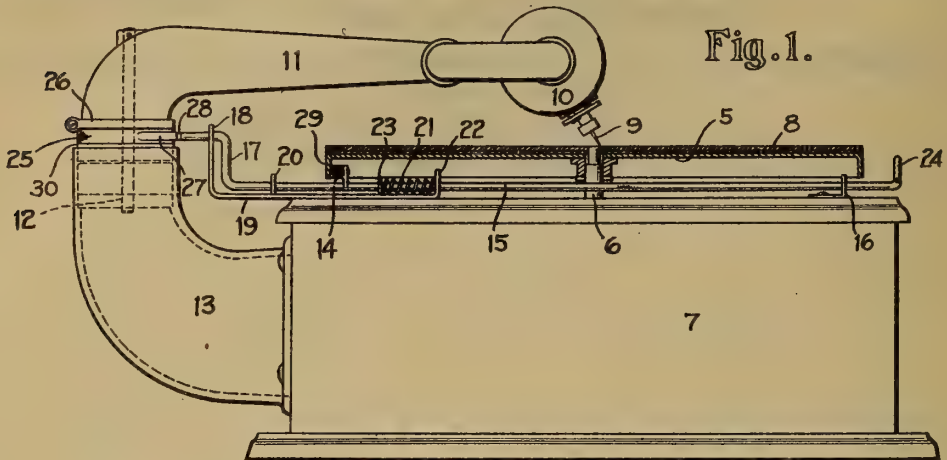


Fig. 1.

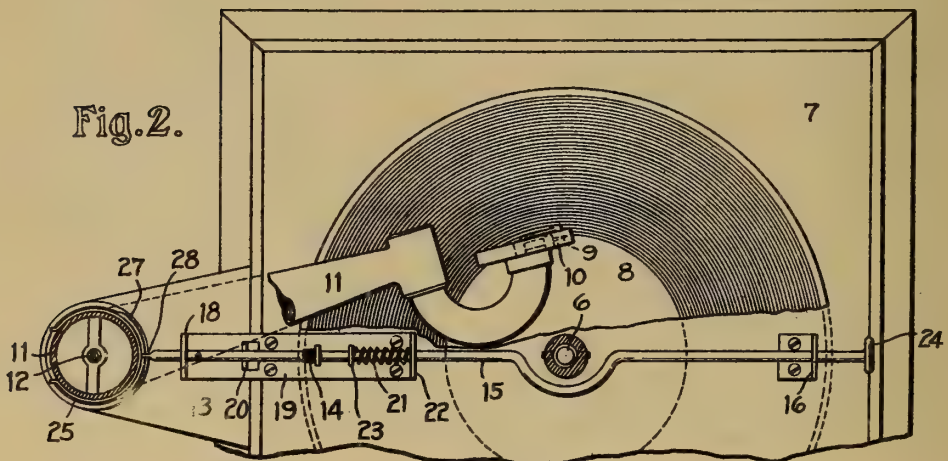


Fig. 2.

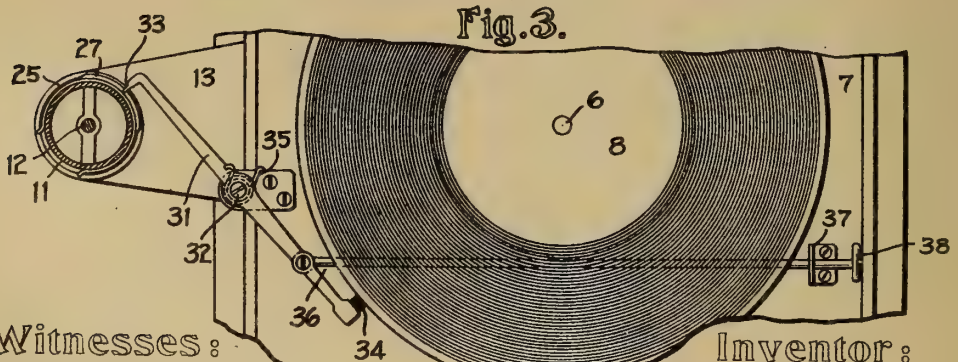


Fig. 3.

Witnesses:
 Clarence W. Carroll
 L. Thon

Inventor:
 Oscar H. Karch
 by his attorney
 Osgood, Davis & Dorsey

UNITED STATES PATENT OFFICE.

OSCAR H. KARCH, OF ROCHESTER, NEW YORK.

AUTOMATIC STOP FOR SOUND-REPRODUCING MACHINES.

1,222,408.

Specification of Letters Patent.

Patented Apr. 10, 1917.

Application filed July 24, 1912, Serial No. 711,303. Renewed September 19, 1916. Serial No. 121,066.

To all whom it may concern:

Be it known that I, OSCAR H. KARCH, a citizen of the United States, and resident of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Automatic Stops for Sound-Reproducing Machines, of which the following is a specification.

This invention relates to a device for automatically stopping a phonograph sound-reproducing machine after the completion of the reproduction of a record, and particularly to a stop of the type in which the movement of the reproducer-mechanism is employed to throw the stop into operation.

The object of the invention is to produce a stop which may be adjusted in a novel and simple manner, according to the length of the record, so as to stop the machine immediately after the completion of a reproduction, and to this end I employ an arrangement in which the necessary adjustment is effected, as a preliminary to the reproduction, by simply moving the reproducer manually to a position in which the stylus registers with the last portion of the record-groove, the mechanism being, as the direct and immediate consequence of this operation, set in a position in which it will thereafter automatically stop the operation of the machine when the stylus again reaches the same point during the reproducing operation.

In the accompanying drawings:—

Figure 1 is a side elevation of a gramophone provided with a stop embodying the present invention, the table of the machine being shown in vertical section;

Fig. 2 is a plan-view of the same machine with parts broken away for clearness of illustration; and

Fig. 3 is a plan-view of a modified form of the invention.

The invention is illustrated as applied to a sound-reproducing machine of the disk type, though it will be understood that it is also applicable to machines of other forms. The drawings show a gramophone having the usual rotary table 5, which is supported by a vertical shaft 6, this shaft being actuated by the usual motor, (not shown) inclosed within the cabinet 7. The record-disk 8 rests upon the top of the table, and is engaged by the stylus 9. The machine has also a sound-box 10, of well-known form, carried by a swinging tone-arm 11. The tone-arm is journaled upon an axis 12 projecting vertically from the horn 13.

The automatic stop comprises a brake by which the rotation of the table 5 may be arrested. In the form of the invention illustrated in Figs. 1 and 2 this brake consists of a block 14, of suitable frictional material, which is adapted to engage the inner surface of a flange 29 depending from the periphery of the table. This brake-block is carried by a lug projecting upwardly from a horizontal slide-rod 15. The slide-rod is concealed, for the most part, beneath the table, and is slidingly mounted, near its forward end, in a bearing-lug 16. The rear-portion of the slide-rod is bent upwardly at 17 and thence horizontally again, the rear-most horizontal portion being guided in a second bearing-lug 18 which is bent upwardly from a plate 19 fixed to the top of the cabinet 7. To prevent the slide-rod from turning in its bearings it is guided also in a cleft bearing-lug 20 projecting from the plate 19.

The brake is thrown into operative engagement with the flange 29 by means of a compression-spring 21 coiled around the slide-rod, one end of this spring being seated against a lug 22 bent upwardly from the plate 19, while the other end engages a collar 23 fixed on the slide-rod. The brake may be disengaged from the table, however, when the machine is to be started, by the manipulation of its forward extremity 24, which is bent upwardly to form a finger-hold by which the slide-rod may be drawn forwardly against the opposition of the spring 21.

During the reproduction of a record the brake is held out of operation by two co-operating controlling-members, of which one is mounted upon, and actuated by, the shank of the tone-arm. The member in question is in the form of a resilient split ring 25, which is clasped around the tone-arm and is confined against vertical movement thereon by flanges 26 and 30 above and below the ring. The controlling-ring 25 is provided with a segmental cam-like projection 27, and this projection is engaged by the second coöperating controlling-member, in the nature of a cam-follower, which consists of a flattened rear-extremity 28 of the slide-rod. At the center of the projection 27 is an abrupt recess or notch adapted to receive the member 28, as shown in Figs. 1 and 2, and when the parts register in this manner the slide-rod is free to move rearwardly sufficiently to bring the brake

into action. When the member 28 rests upon the unbroken portion of the projection 27, however, it is held in a forward position in which the brake does not engage the flange 29, the table being then free to rotate.

It will be apparent that the ring 25, owing to its resilient frictional engagement with the tone-arm, may be turned thereon to adjust it to a position in which the notch in the projection 27 will register with the part 28 at the moment when the tone-arm, in the course of its inward swinging movement due to the feeding of the stylus across the record-disk, reaches a position corresponding to the termination of the record. The arrangement of the parts of the mechanism is such that this adjustment may be made without manipulating the ring 25 directly, however. Supposing the machine to be in the position in which it has been arrested after the performance of a reproduction, with the controlling-members in engagement, as shown in Figs. 1 and 2, and the brake in operation to hold the table; the sound-box may be raised from the record and the disk removed and another disk substituted in the usual manner. To set the stop before throwing the machine into operation the operator holds the sound-box with the stylus a short distance above the surface of the record, and swings the tone-arm inwardly until the stylus is just above the last portion of the record-groove. During this swinging movement the ring 25, since it is locked against rotation by the member 28, does not turn with the tone-arm, the necessary relative movement of these parts being permitted by their frictional engagement. When the stylus has been brought to the position just described the operator pulls on the finger-piece 24, thus disengaging the member 28 from the notch in the ring 25 and at the same time moving the brake out of engagement with the table, which thereupon starts to rotate. The operator then swings the tone-arm and the sound-box into position to start the reproduction. During this last movement the ring 25 turns with the tone-arm, since it has been released by the withdrawal of the member 28. The operator then releases the finger-piece 24, and the spring 21 forces the member 28 into engagement with the projection 27 on the ring 25. The machine now operates in the usual manner until the automatic feeding-movement of the stylus in the groove causes the stylus to reach the inner extremity of the groove, and at this moment the corresponding inward swinging of the tone-arm brings the notch again into operative relation with the member 28, and the brake is then thrown into action to stop the machine.

The construction above described is particularly applicable to a machine in which

the brake operates upon an inner surface of the table. Where it is desirable to have the brake act upon the periphery of the table, however, the construction shown in Fig. 3 may be employed. In this construction a lever 31 is mounted on a pivot 32 fixed to the cabinet of the machine, and this lever carries, at one end, a controlling-member 33 similar in function to the member 28 above described and, at the other end, a brake-shoe 34 adapted to engage the periphery of the table. A coil spring 35 tends to move the brake-shoe toward the table and to maintain the member 33 in engagement with the projection 27 on the ring 25. The operation of this mechanism is substantially the same as that of the mechanism above described and will be obvious. The means for releasing the brake manually comprises a rod 36, which is pivoted to the lever 31 and extends forwardly through a bearing-lug 37 on the top of the cabinet, this rod having a finger-piece 38 by which it may be manipulated. In this case, however, the finger-piece is moved rearwardly, instead of forwardly, to throw the brake out of operation.

I am aware that an automatic stop for a gramophone has been previously proposed, in which a brake has been controlled by two coöperating controlling-members, of which one is connected with the brake, and the other connected with, and actuated by, the tone-arm of the machine, and that in such a construction it has been proposed to render one of these controlling-members adjustable in the general direction of the relative movement of the controlling-members, so that the time of operation of the stop may be varied. In all such previous constructions, however, so far as I am informed, it has been necessary to perform such adjustment by direct manipulation of a controlling-member, or other part of the stop-mechanism. Accordingly, I believe that I am the first to produce an arrangement in which the controlling-members, when in the position in which the brake is released for action, have an interlocking engagement whereby relative movement of the controlling-members is temporarily prevented, so that the adjustment of the mechanism may be accomplished without any direct manipulation of the stop-mechanism, and by merely swinging the tone-arm and the reproducing stylus to the position which it is desired that they shall occupy when the operation of the machine is arrested by the brake.

My invention is not limited to the embodiment thereof hereinbefore described and illustrated in the accompanying drawings, but may be embodied in various other forms within the nature of the invention as it is defined in the following claims.

I claim:—

1. An automatic stop for gramophones

having, in combination with a rotary part and an oscillatory part of a machine, a brake for arresting the movement of said rotary part, and a spring for throwing the brake into operation; means for holding the brake normally out of operation and for throwing it into operation at a predetermined point in the movement of said oscillatory part, said means comprising two controlling-members provided with means by which they are connected, respectively, with the brake and with said oscillatory part and by which they are held in coöperative relation and caused, as the result of their relative movement due to the movement of the oscillatory part, to release the brake at said predetermined point; said controlling-members having parts which interlock when the brake is released as aforesaid, whereby the controlling-members are temporarily locked against said relative movement; and said connecting means between one of the controlling-members and the part with which it is connected, being frictional and yieldable, in the general direction of said relative movement of the controlling-members, to a force greater than that encountered in the operative movement of the mechanism, so that the mechanism may have a preliminary adjusting-movement, to predetermine the point of operation of the brake, by manual movement of the oscillatory part while the brake is in action and the controlling-members are interlocked as aforesaid.

2. An automatic stop for gramophones having, in combination with a rotary part and an oscillatory part of a machine, a brake for arresting the movement of said rotary part, and a spring for throwing the brake into operation; two coöperating controlling-members including a cam having a surface substantially concentric with the axis of oscillation of the oscillatory part, and an abrupt recess in said surface, and a cam-follower having an extremity which engages the cam and which may enter said recess and thereby interlock with the cam when the parts reach the proper relative position; one of said controlling-members being provided with means by which it is connected with the brake, whereby the brake is normally held in inoperative position but is released for operation when the cam-follower enters said recess in the cam; and the other controlling-member being provided with means by which it is connected with the oscillatory part, whereby a movement is imparted to the latter controlling-member, relative to the former controlling-member, in consequence of the movement of the oscillatory part; said connecting means in-

cluding a frictional device yieldable, in the general direction of said relative movement, to the resistance, to such relative movement, due to the engagement of the cam-follower with the notch in the cam, whereby one of the controlling-members may have a preliminary adjustment, to predetermine the time of release of the brake, by manual movement of the oscillatory part while the brake is in operative position.

3. An automatic stop for gramophones and the like having, in combination with a rotary part and an oscillatory part of a machine, a cam adapted to be mounted upon, and to oscillate with, said oscillatory part, the cam having a cam-surface co-axial with the oscillatory part and provided with a recess; a brake-member having a brake-shoe adapted to engage and arrest said rotary part and an extremity adapted to engage said cam-surface, means for supporting the brake-member upon the machine, the brake-member being movable, thereon, toward and from the cam-member, a spring tending constantly to force the brake-member toward the cam, whereby the brake is thrown into operation when said extremity of the brake-member enters the recess in the cam; and yielding frictional means normally retaining the cam in adjusted position on the oscillatory part, the engagement of the brake-member with said recess serving to lock the cam against oscillation in either direction with the oscillatory part, so that the cam-member may be adjusted by manual movement of the oscillatory part.

4. An automatic stop for gramophones and the like having, in combination with a rotary part provided with a depending peripheral flange, and an oscillatory part movable about an axis parallel with the axis of rotation of the rotary part; a resilient split collar adapted to clasp the oscillatory part and provided with a peripheral cam-surface having a notch, a brake-member mounted to slide beneath the rotary part and having a brake-shoe, to engage the inner surface of said flange, and an extremity engaging said cam-surface, and a spring tending constantly to force the brake-member in a direction to cause the brake-shoe to operatively engage the flange, such movement being normally prevented by engagement of said extremity with the cam-surface but being permitted when the notch in the cam-surface receives the extremity of the brake-member.

OSCAR H. KARCH.

Witnesses:

FARNUM F. DORSEY,
D. GURNEE.

STYLUS HOLDER FOR TALKING MACHINES,
#1,222,607-----O.C.De Selms,
Patented-April 17th, 1917.
Filed-August 7th, 1916.

O. C. DE SELMS.
 STYLUS HOLDER FOR TALKING MACHINES.
 APPLICATION FILED AUG. 7, 1916.

1,222,607.

Patented Apr. 17, 1917.

Fig. 1.

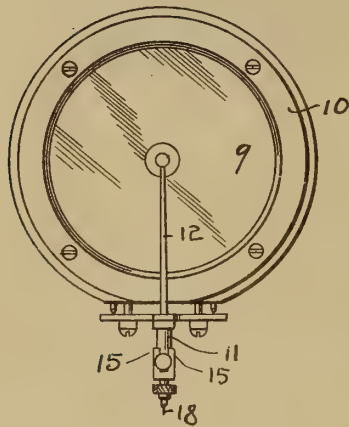


Fig. 2.

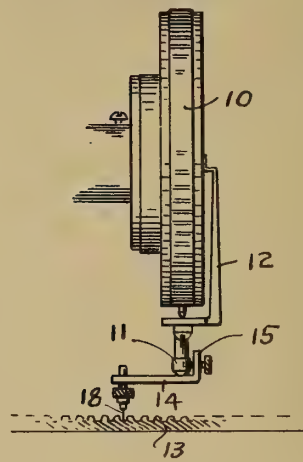


Fig. 4.

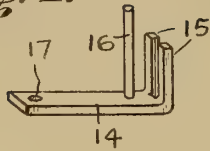


Fig. 3.

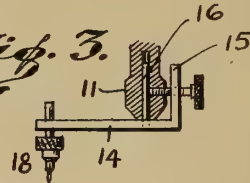


Fig. 6.

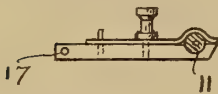


Fig. 7.

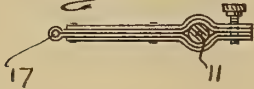


Fig. 8.

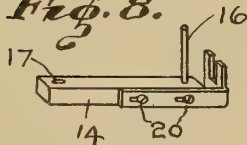
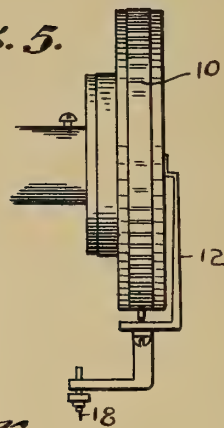


Fig. 5.



Inventor,
 Omar C. DeSelms,
 By *Wintura & Werner*
 Attorneys,

UNITED STATES PATENT OFFICE.

OMAR C. DE SELMS, OF ATTICA, INDIANA.

STYLUS-HOLDER FOR TALKING-MACHINES.

1,222,607.

Specification of Letters Patent.

Patented Apr. 17, 1917.

Application filed August 7, 1916. Serial No. 113,679.

To all whom it may concern:

Be it known that I, OMAR C. DE SELMS, a citizen of the United States, residing at Attica, in the county of Fountain and State of Indiana, have invented certain new and useful Improvements in Stylus-Holders for Talking-Machines, of which the following is a specification.

This invention relates to improvements in talking-machines using records in the shape of flat disks with a continuous spiral groove in its outer face which receives the sound-wave producing surface irregularities to be contacted by a stylus. Some talking-machine manufacturers and record-makers so construct the parts as to contact the stylus with the bottom of the spiral groove of the record disk, on which bottom the sound-producing irregularities of surface are formed, while other manufacturers of talking-machines place the sound-producing irregularities on the sides of the groove with a corresponding structural change in the stylus-holding mechanism. The result is that the two forms of records cannot be played interchangeably on the two styles of stylus-holding machines.

The object of this invention is to provide an attachment for the stylus-holders of those machines which are built to reproduce sounds by contacting the stylus with the side of the groove, whereby the stylus may be held in contact with the bottom of the groove, instead of its side, when it is desired to play records having the sound-producing irregularities on the groove-bottoms.

The object is to provide a simple and inexpensive attachment which may be readily attached to and removed from talking machines now in common use, by inexperienced persons, and both styles of record played at will.

I accomplish the above, and other objects which will hereinafter appear, by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a view in front elevation of a talking-machine diaphragm and stylus embodying my invention. Fig. 2 is a view in side elevation of same. Fig. 3 is a view in side elevation of my attachment on a somewhat larger scale, showing the stylus-holder of the original machine in vertical section. Fig. 4 is a perspective view of the attachment alone. Fig. 5 is a view similar to that

of Fig. 2, of a modified form wherein my invention is an integral portion of the other stylus-holder, and Figs. 6 and 7, are modifications wherein my attachment is formed with a spring-clamp to embrace the stylus-holder of the original machine to which it is to be secured. Fig. 8 is a modification showing the slotted end of my attachment adjustable to stylus sockets of different sizes.

Like characters of reference indicate like parts throughout the several views of the drawings.

The disk 9, frame 10, stylus-holder 11 and connection 12, between the latter and the disk are of common form and of the type to hold the stylus, placed in the holder 11, against the side of the groove of the disk 13. My invention consists essentially in extending an arm laterally of the stylus-holder 11 to form a bent-lever connection, as a whole, with the disk 9, whereby vibrations will be imparted to the disk from a stylus held at the end of the arm against the bottom of the groove in the record as is shown in Fig. 2. This arm-extension 14 has an end bent at right angles and bifurcated to form a pair of prongs 15 which receive the set-screw of stylus-holder 11 between them. The arm also has a fixed pin 16 which fits in the socket in the end of 11, where it is retained by tightening the set-screw, and at the opposite end of the arm from prongs 15 is a hole 17, where the stylus 18, of usual construction, is secured.

As the diameter of the holder 11 varies in different machines the prongs 15 may be bent toward the pin 16 or from it to suit the conditions, or the prongs may be in a separate plate as shown in Fig. 8, adjustably secured to the body of the arm by set-screws which allow the space between the fixed pin and the prongs to be changed.

The modifications of Figs. 5, 6 and 7 will be readily understood from the drawings.

Having thus fully described my invention, what I claim as new and wish to secure by Letter Patent of the United States, is—

1. The combination, with the stylus-holder of a talking-machine having a stylus receiving socket, of a removable arm extending laterally thereof, and means for securing the arm to said holder comprising a pin fixed in the arm and entering the stylus-socket in the stylus-holder, said arm having

means remote from said pin for holding a stylus and means independent of the pin to keep the arm from swinging about the pin.

2. The combination, with the stylus-
5 holder of a talking-machine having a stylus-receiving socket and a set screw, of a removable arm extending laterally of the stylus-holder, a fixed pin in the arm entering the stylus-socket where it is secured by
10 said set-screw, the adjacent end of the arm

being bent and bifurcated forming arms which straddle the set screw, said arm having means remote from the fixed pin for holding a stylus.

In witness whereof, I, have hereunto set 15
my hand and seal at Indianapolis, Indiana,
this 26th day of July, A. D. one thousand
nine hundred and sixteen.

OMAR C. DE SELMS. [L. S.]

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

APPARATUS FOR PRODUCING AUDIBLE MOVING
PICTURES,

#1,222,626-----H. Hess,
Patented-April 17th, 1917.
Filed-June 20th, 1913.

H. HESS.

APPARATUS FOR PRODUCING AUDIBLE MOVING PICTURES.

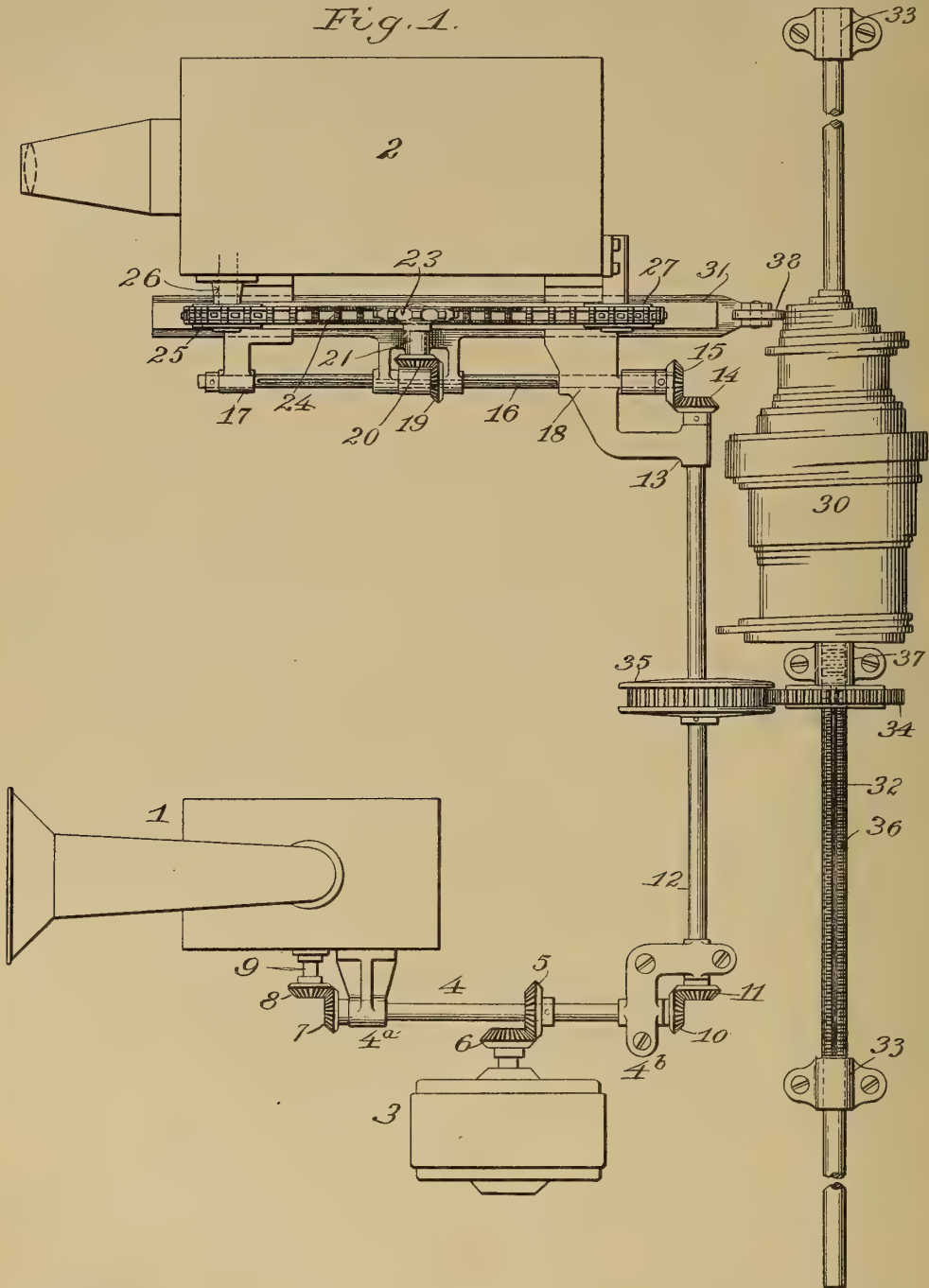
APPLICATION FILED JUNE 20, 1913.

1,222,626.

Patented Apr. 17, 1917.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
M. R. Manning
E. F. Hotchkiss

Inventor
Henry Hess
By *Attorneys*
Rogers, Kennedy & Campbell

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APPARATUS FOR PRODUCING AUDIBLE MOVING PICTURES.

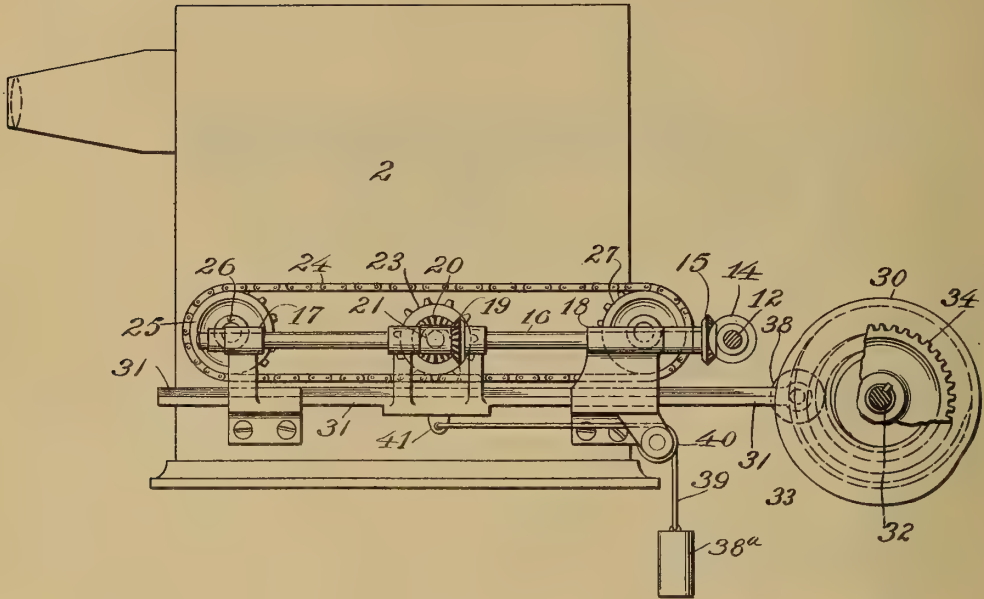
APPLICATION FILED JUNE 20, 1913.

1,222,626.

Patented Apr. 17, 1917.

2 SHEETS—SHEET 2.

Fig. 2.



Witnesses:
H. R. Manning
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Inventor
Harry Hess
By his Attorneys
Roger, Kennedy, Campbell

UNITED STATES PATENT OFFICE.

HENRY HESS, OF PHILADELPHIA, PENNSYLVANIA.

APPARATUS FOR PRODUCING AUDIBLE MOVING PICTURES.

1,222,626.

Specification of Letters Patent.

Patented Apr. 17, 1917.

Application filed June 20, 1913. Serial No. 774,795.

To all whom it may concern:

Be it known that I, HENRY HESS, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Producing Audible Moving Pictures, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to the production of talking or audible animated picture scenes, plays or actions such as are produced by the synchronous reproduction of a phonograph record and a moving picture record, and the object of the invention is to improve the character of the reproduced sounds so that they will be distinct, clear and natural and will be produced in synchronous relation to the corresponding actions as portrayed by the moving picture record.

In making a phonographic record and a moving picture record for a given play or action, the phonographic apparatus and the moving picture apparatus are operated in synchronism, but by reason of the fact that the actors are frequently changing their positions, the sounds will act on the receiver of the phonograph with little or no uniformity, the exigencies in assuming the proper poses, actions and positions, requiring that some of the sounds be uttered at a much greater distance from the receiving instrument than other sounds, and also requiring that the sounds be directed at varying and different angles with relation to the receiving instrument. As a result of these conditions there will be a lack of clarity in tone, and strength of the reproduced sounds.

I propose to overcome these objections in one way, by preparing the phonographic record and the moving picture record in synchronism as usual with the actors observing no more particular or special care in talking into the phonograph than has heretofore been the practice. I then prepare a second phonographic record of the same words or sounds as the first, but independently of the other record and separately therefrom, but in this instance the actors will talk directly into the phonograph at a uniform distance therefrom. This second phonographic record will of course in these circumstances, not be in synchronism with the moving picture record, but the reproduced sounds

will be clear and distinct. This second phonographic record is then reproduced simultaneously with the reproduction of the moving picture record by operating the phonographic apparatus and the moving picture apparatus at uniform and preferably slow speed, by means of which action, it may be determined to what degree and in what respects the two records may be nonsynchronous, and at what particular points in the records such inaccuracies in synchronism occur. Observations may be made during such reproduction, notes taken, and a record made in any suitable manner, to show the relations of the two records. The second phonographic record is now again reproduced simultaneously with the moving picture record, but at normal speed, and in this reproduction, and with the record of inaccuracies as a guide, such changes are made in the speed of one or the other of the records, preferably the picture record, as will cause the reproduction of the two records to be made in synchronism. As an alternative method of procedure, instead of making the comparison between the second phonographic record and the moving picture record as above described, the two phonographic records may be reproduced together and compared to ascertain their relations, and since the first phonographic record was prepared synchronously with the moving picture record, corrections made to bring the two phonographic records into synchronism, would also make the second phonographic record synchronous with the moving picture record. The correction of inaccuracies to make the reproduction of the second phonographic record synchronous with the moving picture record may be made in any appropriate manner and by any appropriate and suitable mechanism. I propose however to adopt for this purpose a correcting member formed with reference to the record of inaccuracies in synchronism, which correcting member is arranged to so cooperate with either the phonographic apparatus or the moving picture apparatus, preferably with the latter, that the speed of the picture film will be varied automatically and predeterminately with relation to the speed of the phonographic record.

My invention therefore comprehends broadly a correcting member or device cooperating with either the phonographic ap-

paratus or with the moving picture apparatus, and acting automatically to vary the speed of one of the records predeterminately in relation to that of the other record to effect the reproduction of the records in synchronism.

In the accompanying drawings:

Figure 1 is a top plan view showing one form of apparatus, by way of example, embodying my invention and suitable for carrying my improved method into effect.

Fig. 2 is a sectional elevation of the same, with parts broken away.

Referring to the drawings:

1 represents a phonographic apparatus, and 2 represents a moving picture apparatus which devices may be driven by any suitable mechanism to cause them to operate in synchronism. In the present instance I have shown a common operating motor 3, from which driving connections extend to both the phonographic apparatus and the moving picture apparatus; but it will be understood that separate motors may be employed for this purpose provided they are continuously synchronous. The driving connections from the motor to the phonographic apparatus comprise a shaft 4 mounted in bearings 4^a and 4^b, and having a bevel gear wheel 5 fixed thereto and intermeshing with a gear wheel 6 fixed to the motor shaft. At one end the shaft has fixed to it a bevel gear 7 meshing with a bevel gear 8 on the driving shaft 9 of the phonographic apparatus, by which means the rotation of the motor imparted to the shaft 4 will be transmitted to the phonographic apparatus. The driving connections from the motor to the moving picture apparatus comprises a bevel gear 10 on that end of the shaft 4 opposite the bevel gear 7, which gear 10 meshes with a bevel gear 11 on the end of a shaft 12 mounted in bearings 13, and extending at right angles to the shaft 4, the shaft 12 carrying at its opposite end a bevel gear 14 meshing with a gear 15 on one end of a shaft 16. The shaft 16 extends at right angles to the shaft 12 and is mounted in suitable bearings 17 and 18. This shaft has splined to it a bevel gear 19 meshing with a bevel gear 20 fixed to one end of a shaft 21 which carries at its opposite end a sprocket wheel 23. The sprocket wheel engages the lower stretch of an endless chain sprocket 24 passing at one end over a sprocket wheel 25 connected to the shaft 26 actuating the moving picture film, and passing at its other end over an idler sprocket 27. These driving connections from the motor to the moving picture apparatus will act on the rotation of the motor to operate the apparatus, and as both apparatuses are driven from the same prime motor, they will be operated by said motor in unison and synchronously.

In order to correct inaccuracies in synchronism which may exist between the phonographic record and the moving picture record in cases where said records are prepared independently of each other, so that their reproduction will be synchronous, I provide for varying the speed of one of the records with reference to that of the other, in this particular instance the variation being in the speed of the moving picture film, and I provide for effecting such variations automatically and predeterminately in accordance with known inaccuracies determined by a preliminary comparison of said records. This variation of speed is effected, in the form of mechanism shown, by means of a correcting member in the form of a rotary cam 30 arranged to act on a horizontally movable slide 31 on which the shaft 21 carrying the sprocket wheel 23 before alluded to is mounted, the rotation of the cam causing the slide to be moved back and forth and giving the sprocket wheel a movement of translation lengthwise of the chain. These actions of the wheel will vary the speed of the chain, from a normal constant speed due to the rotation alone of the sprocket wheel, to a retarded or to an accelerated speed due to the combined translation of the wheel and its rotation, according to the contour of the cam. The cam is mounted on and operated by a horizontal shaft 32 mounted in bearings 33—33 and extending at right angles to the traveling movement of the sprocket chain, and the shaft has splined to it a driving pinion 34 driven by a pinion 35 on the shaft 12 before alluded to, whereby the cam will be rotated in synchronism with the phonographic apparatus and the moving picture apparatus. The shaft 32 is threaded for a portion of its length as at 36, which threaded portion turns in a fixed feed nut 37 so that the cam will be caused to shift endwise in its rotary movement, the shaft in this movement sliding endwise through, while being subjected to the driving action of, the splined pinion 34. The purpose of feeding the cam endwise is to provide an extended and prolonged track without a corresponding increase in diameter.

The cam track extends spirally around the cam continuously from end to end, and is engaged by a roller 38 mounted on the end of the slide 31, the said roller being maintained in contact with the cam track, and the slide being urged constantly to the right, by means of a weight 38^a connected with a cord 39 passing over a guide pulley 40 and connected at its end to the slide as at 41. According to the contour of the cam track, the slide 31 will either remain at rest, or will be shifted to the left, or will be allowed to be drawn by the weight to the right, and by

such movements, the speed of the sprocket chain, and consequently that of the picture film or strip, will be varied as before described.

5 The cam track is laid out according to the particular inaccuracies in synchronism it is desired to correct, which inaccuracies as before described are determined by a preliminary reproduction and comparison of the
10 phonographic record and the moving picture record independently prepared; or by a comparison between two phonographic records, one prepared in synchronism with the moving picture record and the other prepared
15 independently. Guided by the record or notes made of the inaccuracies, and the particular points in the record where the inaccuracies occur, the cam track is shaped and constructed, so that when the cam is incorporated in the operating mechanism as
20 shown, it will act when rotated and moved endwise, to automatically effect in a predetermined manner such changes in speed of the record, that the known inaccuracies will
25 be corrected and the records will be reproduced in proper synchronism.

From the foregoing description it will be seen that by the preparation of the phonographic record with the sounds or words imposed directly onto the receiving instrument, the comparison of this record with the moving picture record portraying the motions and actions associated with the sounds, to determine the extent and character of inaccuracies in synchronism, and the final reproduction of the records subject to the action of my improved correcting member, acting in a predeterminate manner consonant with the known inaccuracies in synchronism, an
30 audible animated picture scene or play may be produced in which the sounds will be clear and free from the muffled effects so common, and in which these sounds will be reproduced in proper synchronism with the
35 portrayal of their appropriate actions or movements. It is manifest that the details of the mechanism shown and described for bringing about such synchronism may be variously modified and changed without departing from the limits of my invention, and it will be understood that the invention is not limited to any particular form or construction of the parts, or to any particular method of procedure except in so far as
40 such limitations are specified in the claims.

Having thus described my invention, what I claim is:

1. In a device of the character described the combination of a phonographic apparatus, a moving picture apparatus, driving
60 means for operating the same to reproduce their respective records simultaneously and non-synchronously, and a correcting member of predetermined functional action operated by the driving means and acting auto-

matically to vary the speed of one of the records predeterminately in relation to that of the other record to effect the reproduction of said records in synchronism.

2. In a device of the character described 70 the combination of a phonographic apparatus, a moving picture apparatus, driving means for operating the same to reproduce their respective records simultaneously and non-synchronously, and a correcting mem- 75 ber of predetermined functional action operated by the driving means and acting to automatically vary the speed of the picture record predeterminately in relation to that of the phonographic record to effect the re- 80 production of said records in synchronism.

3. In a device of the character described the combination of a phonographic apparatus, a moving picture apparatus, driving means for operating the same to reproduce 85 their respective records simultaneously and non-synchronously, and a rotary correcting member of predetermined functional action, operated by the driving means and acting in its rotation to automatically vary the 90 speed of one of the records predeterminately in relation to that of the other record to effect the reproduction of said records in synchronism.

4. In a device of the character described 95 the combination of a phonographic apparatus, a moving picture apparatus, driving means for operating the same to reproduce their records simultaneously, and a rotary cam member operated by the driving means 100 and provided with a cam whose contour represents inaccuracies in synchronism, said cam acting in its rotation to automatically vary the speed of one of the records predeterminately in relation to that of the other 105 record to effect the reproduction of said records in synchronism.

5. In a device of the character described the combination of a phonographic apparatus, a moving picture apparatus, driving 110 means for operating the same to reproduce their records simultaneously, and a rotary cam member movable in the direction of its axis and operated by the driving means, said cam member provided with a cam whose 115 contour represents inaccuracies in synchronism, said cam acting in its movements to automatically vary the speed of one of the records predeterminately in relation to that of the other record to effect the reproduction 120 of said records in synchronism.

6. In a device of the character described the combination of a phonographic apparatus, a moving picture apparatus, driving 125 means therefor acting to reproduce their respective records simultaneously and non-synchronously, and a correcting member of predetermined functional action operated by the driving means and acting automatically to so predeterminately vary the speed of one 130

of the records in relation to that of the other, that the said records will be reproduced in synchronism.

5 7. In a device of the character described the combination of a phonographic apparatus, a moving picture apparatus, operating means therefor, driving connections to the phonographic apparatus, a traveling chain for operating the picture record, a rotary wheel engaging said chain and having a movement of translation lengthwise of the chain, driving connections between the operating means and said wheel for rotating the latter, and means controlled by the operating means for effecting the translating movement of said wheel in accordance with inaccuracies in synchronism to cause said records to be reproduced synchronously.

20 8. In a device of the character described the combination of a phonographic apparatus, a moving picture apparatus, driving means for operating said apparatuses to reproduce their respective records simultaneously and non-synchronously, and a correcting member of predetermined functional action, operated by the driving means and acting automatically to vary the speed of one of the records predeterminately in relation to that of the other to effect their reproduction in synchronism.

30 9. In a device of the character described the combination of a phonographic apparatus, a moving picture apparatus including a picture record, driving means for operating the picture record continuously, a rotary element for driving said means, said ele-

ment having a movement of translation relatively to said driving means to vary the speed of the picture record, driving means acting to operate the phonographic apparatus and the said rotary element to cause the records of said apparatuses to be reproduced simultaneously, and a member operated by the last mentioned driving means and acting on the rotary element to effect its movement of translation in accordance with the inaccuracies in synchronism to cause the records to be reproduced synchronously.

10. In a device of the character described the combination of a phonographic apparatus, a moving picture apparatus, and an endless traveling drive chain for operating the picture record, a rotary sprocket wheel engaging said chain and having a movement of translation in the direction of the travel of the chain, driving means for operating the phonographic apparatus and for rotating the sprocket wheel to cause the simultaneous reproduction of the respective records, and a rotary cam member operated by the driving means, said cam member being provided with a cam whose contour represents inaccuracies in synchronism, said cam acting to effect the translating movement of the sprocket wheel.

In testimony whereof I have affixed my signature in presence of two witnesses.

HENRY HESS.

Witnesses:

ABRAHAM FELT,
W. R. KENNEDY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

TELEPHONE TRANSMITTER,
#1,222,790-----J.G.Nolen & R.L.McElroy,
Patented-Apr. 17th, 1917.
Filed-May 4th, 1914.

J. G. NOLEN & R. L. McELROY.
TELEPHONE TRANSMITTER.
APPLICATION FILED MAY 4, 1914.

1,222,790.

Patented Apr. 17, 1917.

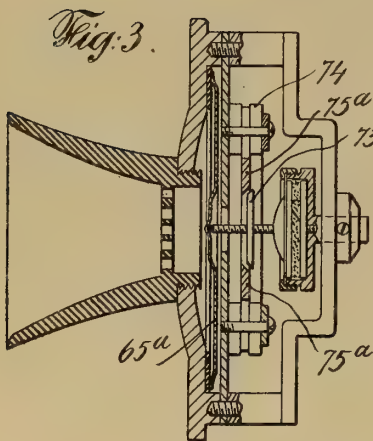
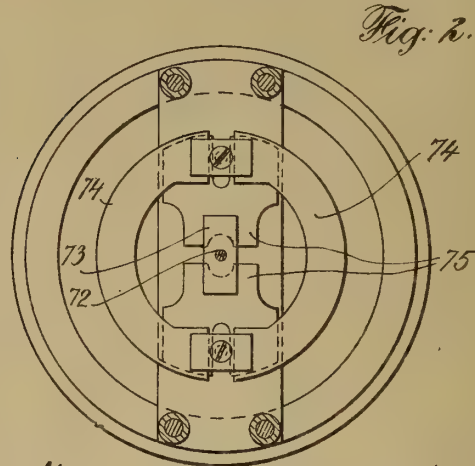
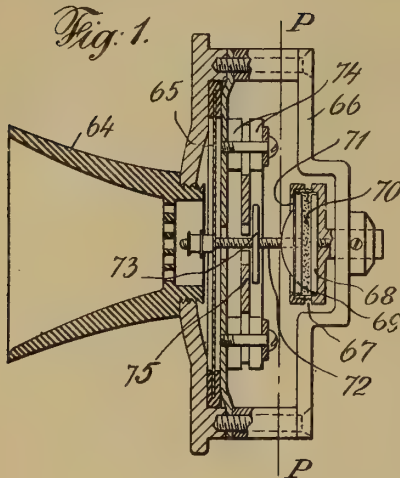
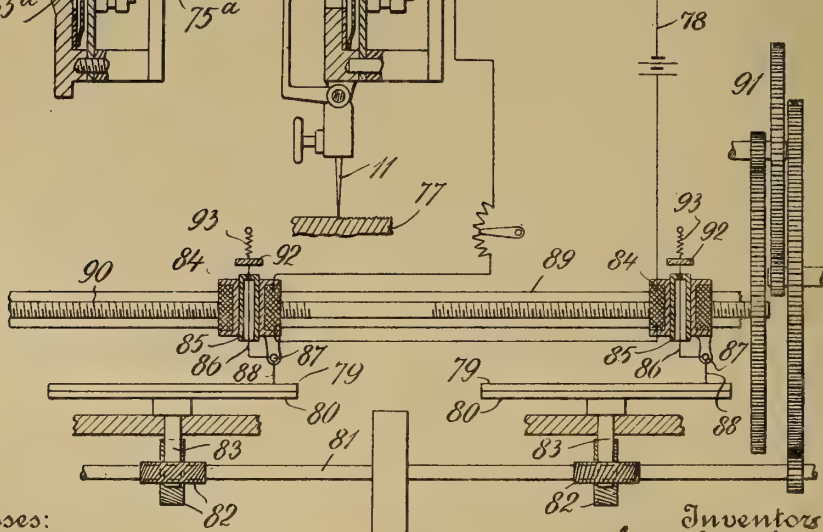
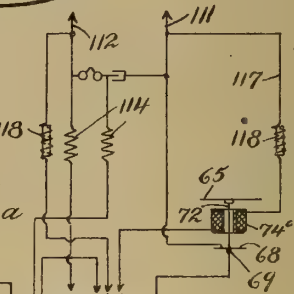
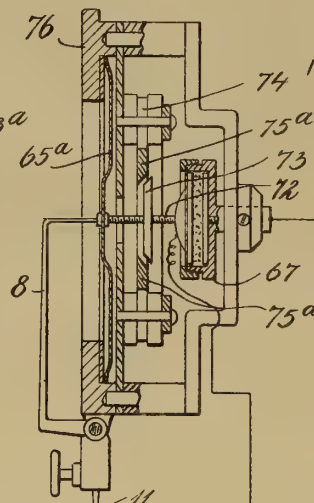


Fig. 4.



Witnesses:
H. B. A. Doring
Paul H. Frank

Inventors
James C. Nolen
Robert L. McElroy
By their Attorneys
Marble & Mathy

UNITED STATES PATENT OFFICE.

JAMES G. NOLEN, OF NEW YORK, AND ROBERT L. McELROY, OF WHITESTONE, NEW YORK, ASSIGNORS TO MAGNETIC PHONOGRAPH COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

TELEPHONE-TRANSMITTER.

1,222,790.

Specification of Letters Patent. Patented Apr. 17, 1917.

Application filed May 4, 1914. Serial No. 836,186.

To all whom it may concern:

Be it known that we, JAMES G. NOLEN and ROBERT L. McELROY, citizens of the United States of America, and residents of New York, in the county and State of New York, and Whitestone, borough of Queens, city and State of New York, respectively, have invented Improvements in Telephone-Transmitters, of which the following is a specification.

Our invention relates to improvements in telephone transmitters and the like, and comprises the combination with the diaphragm and microphone of a telephone transmitter or like instrument, of magnetic means exerting a continual pull on such diaphragm, and thereby keeping the diaphragm normally under tension and also tending to hold that diaphragm normally in a slightly bowed position; the vibrations of the diaphragm, when the instrument is in use, taking place on opposite sides of such bowed position. Other features of our invention will be pointed out hereafter.

The objects of our invention are, to improve the clarity, quality and efficiency of telephonic transmission; to avoid the use of damping springs in connection with the diaphragm; to avoid so-called "side noise", and to accomplish the above objects by simple, compact and relatively inexpensive apparatus.

Figure 1 shows an axial section of a telephone transmitter embodying our invention; Fig. 2 shows a transverse section thereof on the line P—P of Fig. 1. Fig. 3 shows an axial section of an alternative form of telephone transmitter embodying our invention. Fig. 4 is a view, more or less diagrammatic, showing means for the mechanical reproduction of phonographic sound records in accordance with our invention. Fig. 5 is a diagrammatic view illustrating the use of an electromagnet in a telephone transmitter such as shown in Figs. 1, 2 and 3, and illustrating circuits for the supply of current of that magnet from the main line conductors.

In telephone transmitters it is common to use a sound-actuated member, usually a diaphragm formed of metal, which is adapted to vibrate under the influence of sound waves and to actuate a variable-resistance

device, termed a microphone. The normal or rest position of the diaphragm is usually one in which the diaphragm is under no stress, except as the normal or rest position of that diaphragm may be modified by the action of damping springs, bearing more or less lightly against the diaphragm near its edges. While these damping springs may to some extent reinforce the natural resilience of the diaphragm, yet any practicable arrangement of springs to reinforce such natural resilience of the diaphragm has this fundamental disadvantage; that as the deflection of the diaphragm from normal increases, so does the resistance of the spring to such deflection; the result of which is to dampen disproportionately the stronger vibrations. Moreover, diaphragms as commonly employed in telephone transmitters tend to accentuate tones of high pitch, with reference to tones of low pitch; one result being the familiar strident tone of the telephone and another result being a muffling or obscuring of articulate speech and other sounds.

We have discovered that a magnet or magnets may be used to prevent undue response to very loud noises by a telephone transmitter with very great advantages over the use of so-called damping springs, and in particular we have found that a transmitter diaphragm influenced by a magnet as herein described, vibrates much more freely than when damping springs are employed; also that the strident tone is eliminated, the undue accentuation high-pitched tones being avoided, with the result that the human voice is reproduced at the receiver with practically the natural quality of tone and with much greater clearness in articulation. The magnet maintains the transmitter diaphragm in a normal slightly bowed condition in which the diaphragm is under considerable initial stress, thereby avoiding defects in transmission due to a loose diaphragm. We have also found that the disturbing "side tone" is to a large extent eliminated.

In Figs. 1 and 2 we illustrate a telephone transmitter which, except as to the features embodying our invention, is of well known type. 64 designates the usual mouth piece, 65 the diaphragm, 66 the usual bridge, and

67 the usual microphone comprising, as is customary, two carbon disks 68 and 69 between which is a mass of granular carbon 70; carbon disk 69 being carried by a mica diaphragm 71 connected by screw 72 to the telephone diaphragm 65. On this rod 72 we mount an armature 73 of a magnet; which magnet in the construction shown, comprises four horseshoe magnets 74 having common pole pieces 75, structurally separate from the magnet 74 but each clamped between two of said magnets. It will be apparent that as voice waves deflect the diaphragm 65 rearwardly, or to the right of Fig. 1, such deflection of the diaphragm is resisted by the pull of the magnet pole pieces 75 upon the armature 73, the action of the magnet and armature therefore tending to reinforce the resilience of the diaphragm. It will also be apparent that, as the amplitude of vibration of the diaphragm away from the magnet increases the pull of the magnet upon the armature 73 decreases; which we have found to be one feature important for the proper coöperative action of a diaphragm and magnet in telephone transmitters and like instruments. It will be apparent that the action of the magnet in no wise interferes with the variation of resistance of the microphone due to varying compression of the granular carbon; so that this microphone acts to cause the transmission of telephonic waves in the circuit of the telephone, in precisely the ordinary manner, such telephonic waves, however, being modified (as compared with the telephonic waves produced by an ordinary telephone transmitter) by the joint action of the magnet and main diaphragm 65, so that the transmitter is much more responsive to feeble sounds and to overtones, and returns from its deflections much more promptly, than is the case with ordinary telephone transmitters. Test has shown that this transmitter illustrated in Figs. 1 and 2 transmits sound waves electrically with much closer approximation to normal proportions of sound waves of different characters and pitch, than is the case with the ordinary telephone transmitter. In particular, and using the same receiver in connection, alternately, with an ordinary transmitter, and with our improved transmitter, circuit conditions being otherwise the same, it has been found that when our transmitter is used, overtones, not noticeable when the ordinary transmitter is used, are clearly heard, and that articulate speech and other sounds are transmitted much more clearly and distinctly. It is also found that there is a practical suppression of "side noise," so objectionably prominent when the ordinary transmitter is used. The use of our magnet and armature, in connection with the ordinary telephone diaphragm, makes

unnecessary the use of the ordinary damping spring, and so permits much freer vibration of the diaphragm; while, on the other hand, the pull of the magnet prevents undue response to very loud noises (the function of the ordinary damping spring). The transmission of "side tone" or "side noise" by the ordinary telephone transmitter, is understood to be due, in large measure at least, to the fact that in the ordinary transmitter, the damping spring or springs have little or no restraining influence upon the diaphragm when the latter is in or near its normal rest position. Since, according to our invention, the diaphragm is under the stress of a magnet at all times, it is prevented, in very large measure, from responding to sounds not delivered directly into the mouth piece of the transmitter. In practice, the freedom of our transmitter from the transmission of such side noises, is very noticeable indeed.

Fig. 3 illustrates the application of our invention to a somewhat improved form of telephone transmitter. In this transmitter the diaphragm, here designated by numeral 65^a, is supported in an improved manner, and has a better shape. This improved support for the diaphragm and form of the diaphragm, is not of our invention, but is illustrated incidentally. The magnets 74 are of the same construction as shown in Figs. 1 and 2 except that the pole pieces, 75^a, are slightly modified, presenting a contracting space for the play of the correspondingly tapered armature 73^a.

The improved telephone transmitter above described is readily applicable for the production of cut phonograph records, the diaphragm of the instrument being actuated mechanically from a master record, instead of by direct voice waves. The ordinary phonograph records on the market are understood to be made by a process involving the production of a metal die, from the original wax, record, by electroplating; and from this die the commercial records are produced by applying the die, under pressure, to record blanks softened to receive the impress of the die. It is reasonable to suppose that in this electroplating and pressure process of reproduction, much of the delicacy of the original wax record is lost; and that if records be cut mechanically, by instrumentalities of sufficient delicacy and responsiveness, the delicacy of the original record may be maintained, substantially, in the copies produced by cutting. In Fig. 4 we illustrate more or less diagrammatically, apparatus for producing cut records, which shall be true copies of the original or master record. In this figure 76 designates a copying instrument, somewhat similar to the telephone transmitter illustrated in Fig. 3, and comprising a diaphragm 65^a suitably sup-

ported and provided with a vibrating lever 8 carrying at its lower end a reproducing stylus 11 movable over a master record 77. As in Fig. 3, magnets 74 are supported in proximity to the diaphragm 65 and are provided with pole pieces 75^a arranged to influence an armature 73^a acting upon a microphone 67. It will be clear that the instrument 76, when actuated by a master record such as 77, will produce telephonic variations of current in a circuit 78. We have not illustrated means for moving the master record 77 under the stylus 11, but it will be understood that any suitable means for moving such master record may be employed; for example, the ordinary rotating table of a phonograph. The record blanks which are to be cut to correspond with the master record 77, are indicated by numerals 79 and are shown as mounted upon rotating tables 80 arranged to be rotated in unison by a shaft 81, suitable gearing 82 and stub shafts 83. Above the record blank 79 are suitable magnets 84 included in the circuit 78 and shown in this case as having hollow cores 85 within which are mounted, to move axially, rods 86 connected at their lower ends to reproducer shafts 87, and each carrying a stylus mounting 88. The cutting stylus itself, mounted upon the end of each of these stylus mountings 88, may be the ordinary cutting stylus (in the construction shown a cutting stylus to cut lateral indentations), and we do not deem it necessary to illustrate such stylus, as it is of well known construction. The magnets 84 are mounted to move laterally along a slide 89, the stylus shafts 87 being carried by such magnets; and a feed screw 90 driven by suitable gearing 91 from the shaft 81, will traverse these magnets and the parts connected thereto. The rods 86 carried by armatures 92, are provided with retractile springs 93 acting in opposition to the magnets 84. It will be clear that, as the instrument 76 actuated by master record 77, produces telephonic variations in circuit 78, magnets 84 will actuate their armatures 92 to cause the cutting styli carried by rock shafts 87 to produce, in record blanks 79, phonographic indentations which are exact copies of the phonographic indentations of the master record 77, and that in this way records may be produced, by a cutting operation, which are exact copies of the original master records. It will further be apparent that a very large number of record-cutting devices may be included in the one circuit 78 and therefore may be actuated by a single instrument 76; so that a large number of copies of the master record may be produced at one time.

We have not deemed it necessary to illustrate apparatus to copy records of the "hill and valley" type; the necessary modifica-

tion of the apparatus shown in Fig. 4, to enable it to copy "hill and valley" records being obvious.

It is well known that by means of magnets operated by a circuit current variations in which are produced by a telephone microphone, the sound waves actuating the microphone may be reproduced with very considerable magnification. For this reason ample power may exist, in the magnets 84, to do the mechanical work of cutting record blanks 79 of relatively hard material.

In the instrument 76, the diaphragm 65 acts as a mere support for the rod 72 carrying the armature 73^a—a support which permits free axial movement of such rod; for that reason, this diaphragm 65 need not be a complete disk.

What we claim is:—

1. A transmitter for recording and reproducing sound waves comprising in combination a diaphragm, a variable resistance device arranged to be actuated by motion of that diaphragm, and magnetic means tending to pull said diaphragm away from the variable resistance device and disposed on the same side of the diaphragm as the resistance device.

2. A transmitter for recording and reproducing sound waves comprising in combination a diaphragm, a microphone arranged to be actuated by said diaphragm, and magnetic means tending to pull said diaphragm away from the microphone and disposed on the same side of the diaphragm as the microphone.

3. A transmitter for recording and reproducing sound waves comprising in combination a diaphragm support, a diaphragm carried thereby, a variable resistance device operatively connected to said diaphragm, and a magnet mounted upon said diaphragm support tending to pull the diaphragm away from the variable resistance device and disposed on the same side of the diaphragm as the resistance device.

4. A transmitter for recording and reproducing sound waves comprising in combination a diaphragm support, a diaphragm carried thereby, a variable resistance device operatively connected to said diaphragm, a magnet mounted upon said diaphragm support, and an armature operatively connected to said diaphragm, said magnet and armature arranged to pull the diaphragm away from said variable resistance device and disposed on the same side of the diaphragm as the resistance device.

5. A transmitter for recording and reproducing sound waves comprising in combination a diaphragm support, a diaphragm carried thereby, a microphone, means connecting said diaphragm and microphone, an armature mounted upon said connecting means and a magnet operatively related to

said armature, said armature being disposed on the same side of said diaphragm as said microphone.

5 6. A transmitter for recording and re-
producing sound waves comprising in combination a diaphragm support, a diaphragm carried thereby, a variable resistance device, means connecting said diaphragm and variable resistance device, an armature mounted
10 upon such connecting means, a plurality of pairs of magnets, and a pole piece for each such pair, said pole pieces arranged in op-

erative relation to such armature, said armature being disposed on the same side of said diaphragm as said resistance device.

15

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

JAMES G. NOLEN.
ROBERT L. McELROY.

Witnesses:

H. M. MARBLE,
PAUL H. FRANKE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

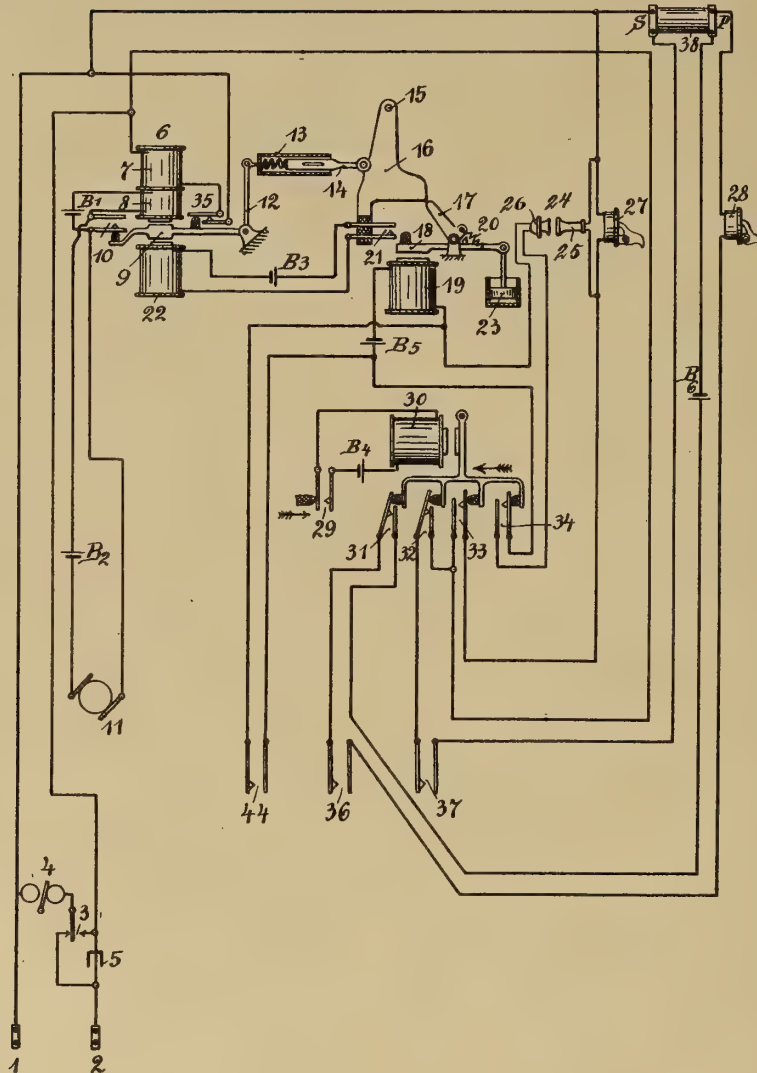
AUTOMATIC PHONOGRAPHIC
RESPONDING AND RECEIVING DEVICE,
#1,222,895-----F. Seelau,
Patented-April 17th, 1917.
Filed-December 29th, 1914.

F. SEELAU.
 AUTOMATIC PHONOGRAPHIC RESPONDING AND RECEIVING DEVICE.
 APPLICATION FILED DEC. 29, 1914.

1,222,895.

Patented Apr. 17, 1917.
 3 SHEETS—SHEET 1.

Fig. 1.



Witnesses.
 Ida O. Lummey
 Madeline L. Vrsich

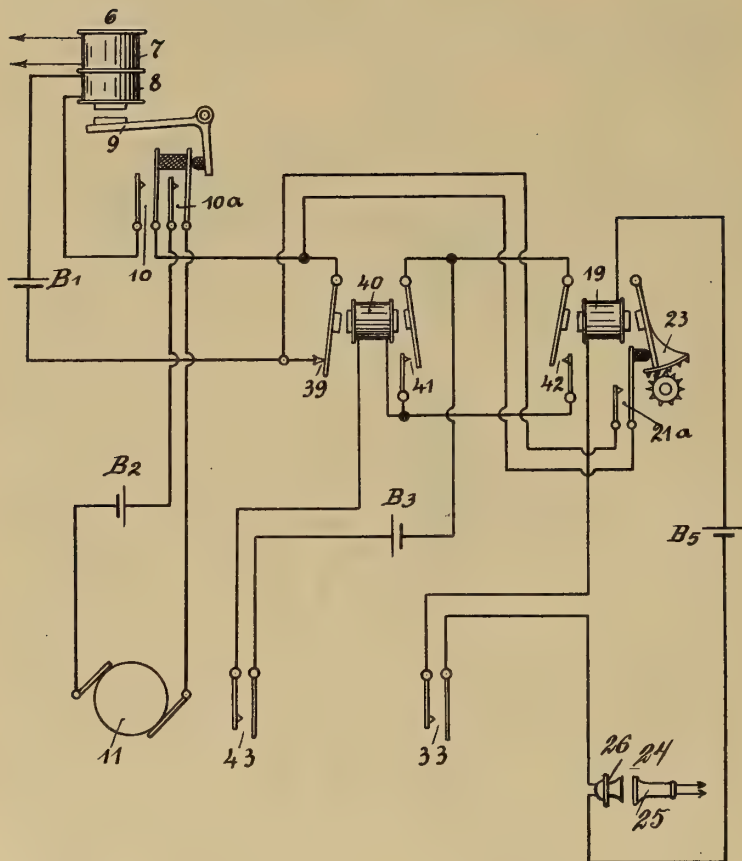
Inventor.
 Franz Seelau
 by his attorneys
 Briesen & Jumper

F. SEELAU.
 AUTOMATIC PHONOGRAPHIC RESPONDING AND RECEIVING DEVICE.
 APPLICATION FILED DEC. 29, 1914.

1,222,895.

Patented Apr. 17, 1917.
 3 SHEETS—SHEET 2.

Fig. 2.



Witnesses.
 Ida O. Kummer
 Madeline L. Hirsch

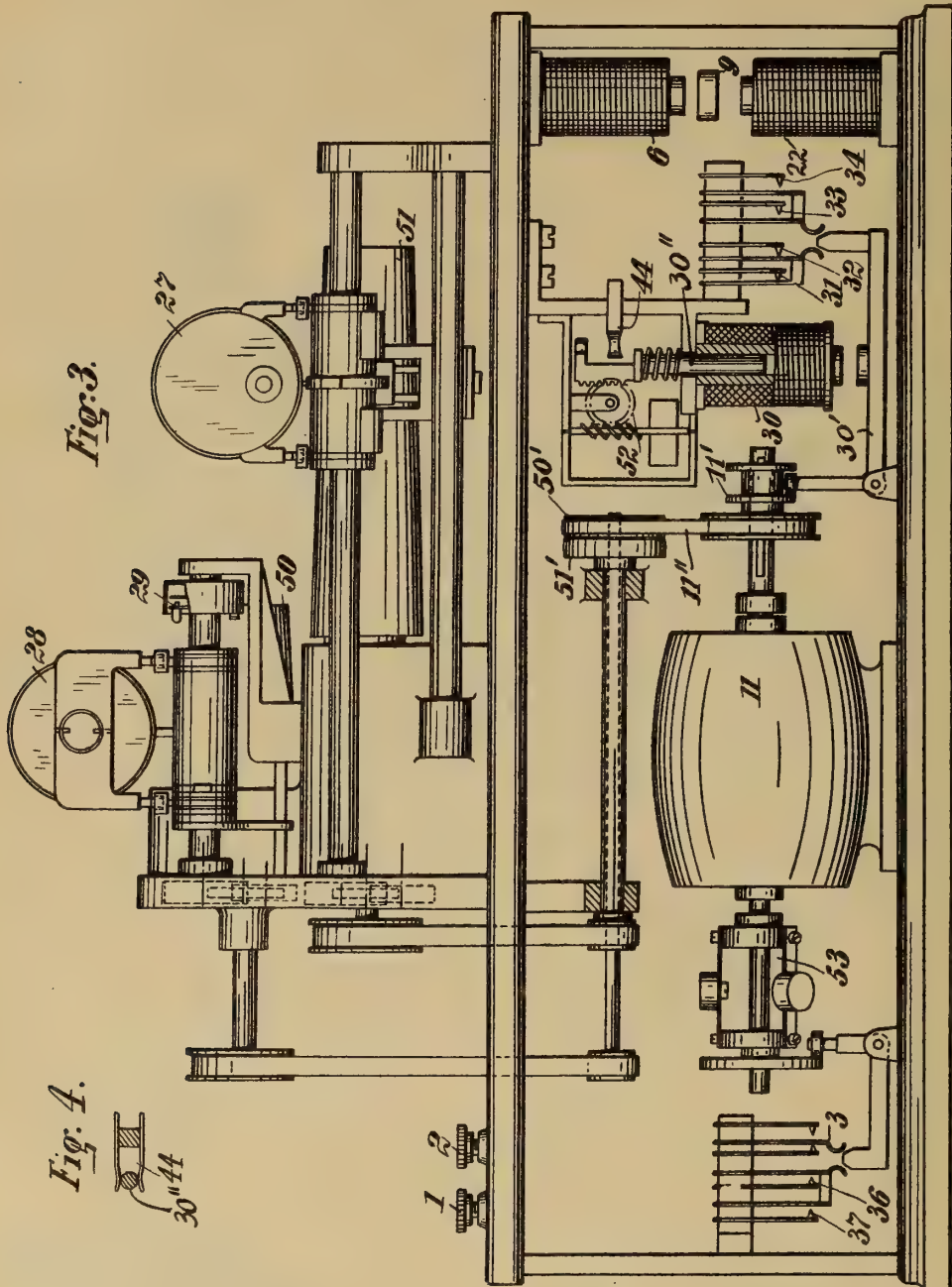
Inventor.
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 by his attorneys
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F. SEELAU.
 AUTOMATIC PHONOGRAPHIC RESPONDING AND RECEIVING DEVICE.
 APPLICATION FILED DEC. 29, 1914.

1,222,895.

Patented Apr. 17, 1917.

3 SHEETS—SHEET 3.



Inventor
 Franz Seelau
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UNITED STATES PATENT OFFICE.

FRANZ SEELAU, OF BERLIN-WILMERSDORF, GERMANY, ASSIGNOR OF ONE-HALF TO
ALEXANDER M. NEWMAN, OF BERLIN-WANNSEE, GERMANY.

AUTOMATIC PHONOGRAPHIC RESPONDING AND RECEIVING DEVICE.

1,222,895.

Specification of Letters Patent. Patented Apr. 17, 1917.

Application filed December 29, 1914. Serial No. 879,427.

To all whom it may concern:

Be it known that I, FRANZ SEELAU, a citizen of the German Empire, and residing at Berlin-Wilmersdorf, Germany, have invented certain new and useful Improvements in Automatic Phonographic Responding and Receiving Devices, of which the following is a specification.

This invention relates in general to instruments used in connection with telephones and which automatically respond to callers and record their messages. The invention bears less upon the responding and recording devices themselves than upon the auxiliary devices which govern the coöperation of the instrument with the apparatus at the telephone exchange and which cause the phonographic devices to act.

It is well known that modern telephone exchanges are equipped with automatic apparatus that enable the operator at the exchange to supervise established telephone connections. This apparatus is generally controlled by switching operations at the telephone station that cause current to flow from the exchange battery through the telephone line around the by-path of a condenser or to cease flowing on account of the line circuit being blocked by the condenser.

Two kinds of telephone exchange systems with automatic clearing or supervisory signals are widely used. In the one kind the supervisory signals are caused to disappear when a condenser is made to block the talking circuit by the raising of the receiver from the switchhook and in the other kind these signals disappear when the condenser is bridged over by a path for continuous current from the central exchange battery. Thus in the case of exchanges of the first type where the signals appear upon their de-energization, a closed path for continuous current exists as long as the telephone is not in use *i. e.* as long as the receiver is on the hook, while in exchanges of the second kind, where the subscribers' lines are permanently connected to the central exchange battery, in order that a current may flow through the calling signal of a line as soon as it is closed, the subscriber's line circuit is blocked by a condenser that is included in the line circuit in series with the subscriber's bell as long as the subscriber's telephone is not in use. When the telephone is taken into use a switching operation occurs by which a cir-

cuit for continuous current is closed through the telephone and this current causes the supervisory signal at the exchange to indicate that a conversation is being carried on.

The apparatus in the telephone exchange which are not mentioned above, need not be taken into account as it is only essential that the phonographic responding and receiving instrument be arranged to change the circuit conditions of the subscriber's line in the same manner as any ordinary telephone instrument so as to cause the proper operation of the supervisory signals at the exchange at the beginning and end of a conversation.

Further functions of the phonographic instrument consist in the starting of the responding device, in changing the instrument into its message receiving condition at the end of the response, and in restoring all parts to their normal positions when the message has been recorded. These functions are in themselves of a simple kind and they correspond in a general way to the circuit changes effected in an ordinary telephone instrument by the hookswitch, except that they all have to be performed entirely automatically. Further switching functions consist in connecting the microphone circuit for giving the response, in connecting the receiver circuit for recording the caller's message and in disconnecting these circuits and reconnecting the calling device after the message has been received. It is an important feature of the invention that the responding sound box and the receiving sound box are not operative simultaneously but are made operative separately at the proper moments by an automatic device. This device also causes the other apparatus to act at the different moments in which their operation is required so that no apparatus will ever be in the operative condition, when its operation is unnecessary.

The invention is illustrated in the drawing, Figure 1 showing the circuits of an entire instrument; Fig. 2 showing a modified method of controlling the calling relay of the instrument; Fig. 3 is a side elevation, with parts in section, illustrating one mode of carrying out certain mechanical and electrical arrangements; and Fig. 4 is a detail sectional view of one of the switches forming part of the apparatus.

The telephone line coming from the tele-

phone exchange, which is not indicated, is connected to the terminals 1, 2 of the instrument. From the terminal 2 a connection extends to a circuit changer 3 that is arranged to connect a bell 4 to the near side or far side of a condenser 5 included in the wire of terminal 2. By these parts the supervisory signals at the exchange are controlled in the manner previously indicated. If the instrument is connected to an exchange whose supervisory devices give the clearing signal when the line circuit is closed the circuit changer 3 will be arranged so that the illustrated position will be its normal position, while its right hand contact will be closed when the instrument is being used. In exchanges in which the clearing signal is given when the line circuit is opened the circuit changer 3 will be arranged to act in the opposite manner, *i. e.* the illustrated position would indicate the operating condition of the circuit changer. If an audible calling signal is not required a simple retardation coil forming a suitable current path for the supervisory signal current from the exchange battery may take the place of the bell 4.

From the condenser 5 a connection extends to an electromagnetic switching device 6, which will be called a calling relay. This relay has two windings 7 and 8, the calling winding 7 being connected to the exchange line and the winding 8 being a locking winding which is included in a local battery circuit by the closure of its contact 10 when the armature 9 is attracted. When this locking circuit is closed the armature of the relay 6 is locked in its attracted position until it is restored by another means that is subsequently described. The contact 10 also closes the circuit of the motor 11 which drives the phonographic devices whose functions are described in subsequent paragraphs. The armature 9 is shaped in the form of a bell lever to the arm 12 of which one end of a thrust rod 14 is coupled by a spring 13. The other end of the rod is fixed to a contact rocker 16 which is pivoted at 15. When the armature 9 is attracted the spring 13 is compressed and this would cause the rocker 16 to be moved toward the right if it were not prevented by the detent 17. This detent 17 is attached to the armature 18 of an electromagnet 19 in such a manner, that it releases the rocker 16 when the armature 18 is attracted and when the armature 18 subsequently returns to its original position the detent swings downwardly on its pivot so that it may pass the rocker 16. A spring 20 then brings the detent 17 back into its blocking position. The rocker 16 carries a pair of contacts 21 forming a switch which lies in the path of travel of the armature 18 when the rocker is in its right hand position so that this switch will be closed if the ar-

mature 18 then returns to its normal position. This will close the circuit of an electromagnet 22 which will be energized and will pull the armature 9 of the calling relay 6 back into its normal position so that the contact or switch 10, whose closure started the described operations, will be reopened.

The arrangement could also be such that the switch 21 is normally closed and is inserted in the locking circuit of the winding 8 of the calling relay 6. A separate restoring magnet 22 could then be dispensed with for the restoring of the armature 9 would then be effected by the locking circuit of 8 being disrupted by the opening of the switch 21.

A retarding device 23 is coupled to the armature 18. This acts in such a way that it allows the armature 18 to be attracted immediately the magnet 19 is energized but causes the armature to swing back slowly when the magnet 19 is deenergized so that the switch 21 is operated only when a certain period after the deenergization of the magnet 19 has elapsed.

24 indicates a switching device that is energized by talking currents and which, in its simplest form may consist of a telephone receiver 25 coupled with a microphone 26. The microphone 26 is included in the circuit of the magnet 19, while the telephone receiver 25 may be connected to the talking wire. The microphone 26 ordinarily presents so much resistance to the energizing current of the magnet 19 that this current is not strong enough to attract the armature 18. But if the receiver 25 is energized by talking currents the condition of the microphone 26 will be altered so that its resistance diminishes. Consequently the magnet 19 will receive sufficient current to excite it. But as soon as the receiver 25 ceases to be excited by talking currents the resistance of the microphone 26 rises so that the magnet 19 ceases to be energized.

The receiving device or recorder which records the caller's message on the phonographic cylinder is indicated at 27. As the construction of the same has no bearing on the present invention it will only be indicated in a general way. It consists chiefly of a telephone receiver whose diaphragm is coupled with a phonographic recording stylus. The mechanical parts of this device may, however, be constructed in accordance with other phonographic recording principles.

28 denotes the principal part of the responding device that acts in conjunction with the parts of this invention; its details may be arranged in any desirable manner. It will be assumed that it consists of any desirable type of microphone whose diaphragm is mechanically coupled with a phonographic reproducing stylus. The other

parts of the responder and of the receiving device have no bearing upon the invention. It need only be mentioned that the devices 27 and 28 are arranged in the usual way like the sound boxes of talking machines (phonographs) *i. e.* the stylus of the responder 28 is actuated by a sound reproducing cylinder while the stylus of the receiving device 27 engages with a sound recording cylinder.

An important part is played by the switch 29 which is closed by the responder 28 after it has given the response to the caller and which is re-opened when the caller's message is recorded. The other arrangements of this switch are of no importance. The switch 29 has a tendency, say by the action of a spring, to take the open position shown in Figs. 1 and 3. As shown in Fig. 3, the switch 29 is in the path of the slide carrying the responder 28, so that as the latter moves toward the right as indicated by the arrow in Fig. 1, it will engage the switch 29 and close the circuit at this point. When the responder 28 returns to its initial position, moving from right to left, it comes out of engagement with the switch 29 and the latter resumes its normal open position. The means for causing the responder 28 to return to its normal position form no part of my present invention and have not been shown in the drawings, so as not to obscure the illustration of the parts to which my present invention relates. However, mechanism suitable for returning the responder to its normal position is disclosed, for instance, in Fig. 1 of my United States Letters Patent No. 1168432. The function of the switch 29 is to close the circuit of an electromagnetic switch 30 which uncouples the responding cylinder 50 and couples the recording cylinder 51 to a driving device when it is energized and controls a number of switches 31, 32, 33, 34, the switches 31, 32 being opened while the switches 33, 34 are closed. Fig. 3 shows one end of the armature lever 30' as controlling the position of a sleeve 11' by means of which the driving belt 11'' can be shifted from the pulley 50', in operative connection with the responding cylinder 50, to the pulley 51', in operative connection with the recording cylinder 51. The other end of said armature lever 30' controls the position of the switches 31, 32, 33, 34. The reasons for these switching functions will be explained when the mode of operation of the instrument is described. The functions of other switches 35, 36, 37 in the various circuits will then also be made clear. These switches and also the contact 3 may be controlled by the armature 9 of the calling relay 6 or preferably by the motor 11. In order that the circuits may be represented in a simple manner it will be assumed that the normally

closed switch 35, by which the calling winding 7 of the calling relay 6 is disconnected from the talking wire, is controlled by the armature 9, while the switches 36 and 37 are controlled in any suitable way by the motor 11, for example, by the governor switch 53 of the motor. The circuit changer 3 may be also shifted by this means.

As regards the other elements of the circuit combination of the instrument, it need only be mentioned that the microphone of the responder 28 is connected in the well known manner with an induction coil 38 the secondary windings of which are connected to the talking or line circuit. The connections of the speech transmission circuits may, of course, be arranged in any other known manner. The batteries B¹ to B⁶ shown in the various parts of the system of circuits may be individual batteries, but it will generally be preferable to use one or several common batteries.

Finally mention must be made of a switch 44 which is adapted to close the circuit of the electro-magnet 19 as well as the telephonic relay 24, and which is provided for the purpose of preventing disturbances in the instrument in case certain operations are carried out in an unusual manner, as described in subsequent paragraphs. The arrangement of this switch is such that it is momentarily closed at the end of the responding operation and after the recording sound box has traveled along the recording cylinder through a distance of a few revolutions. This switch may be actuated, for example, by the armature 30'' of the switching device 30 in which case it would be operated together with the other switches of this device at the finish of the responding operation when the action of the recording cylinder is started. This switch may be equipped with a suitable retarding device 52 by which it is closed after the recording cylinder 51 has executed a few revolutions.

The operation of the instrument is as follows:

The calling current flows from the telephone exchange through the telephone line to the terminals 1 and 2 and through the bell 4. A part of the calling current flows through the windings 7 of the calling relay 6 and energizes this relay so that it attracts its armature 9 and closes the contact 10. This results in the flowing of current from the battery B¹ through the winding 8 which keeps the armature 9 attracted even if the current through the winding 7 ceases. The contact 10 simultaneously closes the circuit of the battery B² and of the motor 11 of the instrument so that the motor is started and shifts the circuit changer 3 thereby causing the supervisory signal at the exchange to apprise the exchange operator of the proper reception of the call. It will

be observed (Fig. 1) that both terminals of the locking winding 8 are connected with like poles of the batteries B¹, B², and not with poles of opposite polarity; hence the relay 6 can be kept energized by a current flowing through the winding 8, only after the armature 9 has been attracted so as to close at the contact 10, the circuit from the battery B¹ through the winding 8. At the same time the switches 36 and 37 are closed and this results in the responding microphone 28 receiving current from the battery B⁶ through the contact 31 and in the connection of the secondary circuit of the responder through the switches 32, 37 to the exchange line. The responding cylinder 50 now acts upon the responder 28 and the response recorded on the responding cylinder is transformed into talking currents which are transmitted through the induction coil 38 to the exchange line and thus to the person who called the instrument. This responding condition of the instrument remains unaltered until the responder has pronounced the entire response. The switch 29 is then closed which causes the electromagnet 30 to be energized and this results in the responding cylinder 50 being thrown out of engagement with the driving gear and in the starting of recording cylinder 51.

The armature of the magnet 30 also alters the condition of the switches 31, 32, 33, 34 so that 31 opens the primary circuit and 32 opens the secondary circuit of the microphone 28 of the responder whose action is no longer required. The switch 33 connects the recording sound box 27 and the telephonic relay 24, which is actuated by the talking currents, to the exchange line while the switch 34 closes the secondary circuit of the telephonic relay 24 which includes the battery B⁵ and the electromagnet 19.

After the caller, who is connected through the telephone exchange to the instrument, has received the response imparted to him by the responder 28, he will commence delivering his message. The talking currents representing the message will flow through the recording sound box 27, which will have been shifted onto the recording cylinder 51, and the diaphragm of the sound box will be oscillated so as to produce a phonographic record. The talking currents also energize the receiver 25 of the telephonic relay 24 and thus reduce the resistance of the microphone 26 sufficiently to cause an energizing current to flow through the electromagnet 19. This magnet will then attract its armature 18 and will move the detent 17 so as to release the contact rocker 16 so that it will be moved by the thrust exerted upon it by the spring 13 of the attracted armature 9 into its operating position in which the switch 21 is located above the armature 18. Short intervals that occur during the de-

livery of the message, and during which the telephonic relay 24 is not energized, will not result in any alteration of the message receiving condition, because the dash-pot 23 releases the armature 18 only after a certain defined interval, that is long enough for all practical purposes, has elapsed. When the armature 18 finally moves up the spring 20 allows the detent to turn down, so that the rocker 16 remains in its operating position and the armature 18 closes the switch 21. This completes the circuit of the magnet 22 which is then energized and pulls down the armature 9 of the calling relay 6 thus opening the contact 10 of the locking winding 8 so that the relay 6 reverts to its normal condition. This removes the thrust exerted upon the spring 13 so that the rocker 16 also returns to its normal position and the detent 17 assumes its normal position behind the rocker 16, while the switch 21 that is moved out of the path of the armature 18 is re-opened and the circuit of the magnet 22 disrupted. The opening of the contact 10 also switches off the motor 11 so that the switches 3, 36 and 37 assume their normal positions. The circuit of the magnet 30 is also opened so that the switches controlled by its armature also assume their normal positions and all parts of the instruments are thus restored to their ordinary positions.

Cases will arise in which the calling subscriber will not deliver a message, for example, when a wrong connection is established by the exchange operator. The telephonic relay 24 will not be energized in such cases and in order to restore the instrument so that it will be in readiness for the next message the switch 44 comes into action. The circuit of the magnet 19 will then be closed momentarily by 44 instead of by the telephonic relay 24. The magnet 19 will then attract its armature 18 and release the rocker 16. All parts of the instrument will then be restored to their normal positions in the manner already described.

Fig. 2 shows diagrammatically a purely electromagnetic locking device for the relay 6 this device being also controlled by a telephonic relay. For the sake of brevity, only the differences between this device and that already explained will be described. In this device the armature 9 is provided with a contact 10^a for switching on the motor 11 that is separate from the locking circuit contact 10. The locking circuit includes the back contact 39 of a relay 40 and a front contact 21^a of a relay 19 is connected in parallel with 39. The relay 19 performs the functions of the magnet 19 of Fig. 1. The circuit of the relay 40 is prepared by a switch 43 and is closed by the switch 42 of the relay 19. The switch 43 is controlled by the motor 11. The relay 40 has a switch 41

by which it keeps its own locking circuit closed after it has been energized and by which the relay 40 is prevented from affecting the locking circuit of 8, this locking circuit being then controlled solely by the telephonic relay 24. The winding of the relay 19 is connected in the manner described above to the microphone circuit of the telephonic relay 24. All that still needs mentioning is that the switch 42 of the relay 19 is an ordinary switch, while the switch 21^a, that corresponds to the switch 21 of Fig. 1, is equipped with a retarding device 23 which acts in such a way that the switch 21^a opens only when a certain interval after the deenergization of the relay 19 has elapsed. The switches 21^a and 42 could be operated by separate relays.

The operation of this device is as follows:—

The attracted armature 9 closes the switches 10 and 10^a. 10 completes the locking circuit which includes the locking winding 8 and the back contact 39 of the relay 40, so that the armature 9 is locked in its attracted position, and 10^a switches on the motor 11. The motor then closes the switches 43 and 33. This condition of the instrument continues until the telephonic relay 24 and the recording sound box 27, Fig. 1, are energized by the talking currents in the manner described in connection with Fig. 1. The relay 19 will then be energized in a circuit which includes the switch 33 and will close the switches 42 and 21^a. Switch 42 closes the circuit of relay 40 which breaks the circuit of the locking winding 8 at contact 39. But as the circuit of winding 8 was previously closed by 21^a the armature 9 remains in its attracted position. When the current through the relay 19 is weakened the switch 42 is opened. Nothing will, however, be affected by this because the relay 40 is kept energized by its locking contact 41. But the switch 21^a will be opened after a certain interval by the retarding device 23, this interval being longer than the intervals which ordinarily ensue during the delivery of a message. When the switch 21^a is opened and the circuit of the winding 8 is thus interrupted the calling relay 6 is deenergized and the armature 9 falls back and opens the switches 10 and 10^a. This switches off the motor 11 and the consequent opening of the switches 43 and 33 deenergizes the relay 40 so that all parts of the instrument are restored to their normal positions.

I claim:—

1. In combination with an automatic responding and conversation recording instrument, a telephone exchange, a source of calling current, an electromagnet, a switching member controlled by the said electromagnet, a circuit for energizing the said electro-

magnet by current from the said source and for operating the said switching member, means for locking the switching member in its operated position, and means actuated by the said electromagnet for controlling a supervisory signal located at the exchange.

2. In combination with an automatic responding and conversation recording instrument, a telephone exchange, a source of calling current, an electromagnet, a switching member controlled by the said electromagnet, a circuit for energizing the said electromagnet by current from the said source and for operating the said switching member, means for locking the switching member in its operated position, means actuated by the said switching member for controlling a supervisory signal located at the exchange, a talking current circuit, a telephonic switching device adapted to be energized by current in the talking circuit, means for maintaining the instrument in an off-normal condition, this means being controlled by the said telephonic switching device and being rendered operative during the flowing of talking current through the telephonic switching device, and means for restoring the said switching member to its normal position after the said telephonic switching device ceases to be energized.

3. In combination with a telephone exchange, a source of calling current, and an automatic responding and conversation recording instrument comprising an electromagnet having an energizing and a locking winding, a switching member controlled by the said electromagnet, a circuit for energizing the said energizing winding by current from the said current source and for operating the said switching member, means for energizing the said locking winding, means actuated by the said electromagnet for controlling a supervisory signal located at the exchange, a responding microphone, a recording device, electrical connections joined to the responding microphone and to the recording device, and means for automatically altering the electrical connections of responding microphone, recording device and of the said energizing winding.

4. In combination with a telephone exchange, a source of calling current, an exchange line, and an automatic responding and conversation recording instrument comprising an electromagnet having an energizing and a locking winding, a switching member controlled by the said electromagnet, a circuit for energizing the said energizing winding by current from the said current source and for operating the said switching member, means for energizing the said locking winding, means actuated by the said electromagnet for controlling a supervisory signal located at the exchange, a responding

microphone, a recording device, a telephonic switching device and means for automatically and separately connecting the said energizing winding, the responding microphone and the recording device together with the telephonic switching device to the said exchange line.

5 5. In combination with a telephone exchange, a source of calling current, an exchange line and an automatic recording and responding instrument comprising an electromagnet having an armature, means for locking said armature in its attracted position, a telephonic switching device, a restoring switch, means for moving the restoring switch, a retarding device for delaying the movement of the said restoring switch, said restoring switch being adapted to restore the said armature to its normal position and
10 said restoring switch and retarding device being controlled only by the telephonic switching device.

6. In combination with a telephone exchange, a source of calling current, an exchange line and an automatic recording and responding instrument comprising an electromagnet having an armature, means for locking said armature in its attracted position, a restoring switch, a telephonic switching device, an operating device controlled by the said armature for moving said restoring switch, means for preventing the action of the said operating device, said telephonic switching device actuating the said preventing means when energized and then causing the said operating device to shift the restoring switch which unlocks the said armature.

7. In combination with a telephone exchange, a source of calling current, an exchange line and an automatic recording and responding instrument comprising an electromagnet having an armature, means for locking said armature in its attracted position, a restoring switch for restoring said
45 armature, a telephonic switching device, an operating device controlled by the said armature for moving said restoring switch, a detent for preventing the action of the said operating device, said telephonic switching device actuating the said detent when
50

energized and then causing the said operating device to shift the restoring switch which restores the said armature to its retracted position.

8. In combination with an automatic responding and conversation recording instrument and mechanism for actuating said instrument, an electromagnet, an armature therefor, adapted to bring said mechanism into operation, a telephone exchange, a telephone line connecting said instrument with said exchange, a source of calling current adapted to energize said electromagnet through said telephone line, to operate said armature and thus bring said actuating mechanism into operation, means for locking the armature in its operated position, a switching member controlled by said actuating mechanism, and means controlled by said switching member and adapted to control a supervisory signal at the exchange as long as said mechanism is in operation.

9. In combination with an automatic responding and conversation recording instrument and mechanism for actuating said instrument, a telephone exchange, a telephone line connected with said exchange, means connected with said line, for bringing said actuating mechanism into operation, a switch controlled by said actuating mechanism, and a condenser controlled by said switch and adapted to control a supervisory signal at the exchange when said mechanism is in operation.

10. In combination with an automatic responding and conversation recording instrument and mechanism for actuating said instrument, a telephone exchange, a telephone line connecting said instrument with the exchange, and a condenser controlled by the operation of said actuating mechanism, for controlling a supervisory signal at the exchange.

In testimony whereof I affix my signature in presence of two witnesses.

FRANZ SEELAU.

Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.

AUTOMATIC STOP MECHANISM FOR
PHONOGRAPHS,

#1,222,974-----A. Nielsen,

Patented-April 17th, 1917.

Filed-November 21st, 1913.

A. NIELSEN.
AUTOMATIC STOP MECHANISM FOR PHONOGRAPHS.
APPLICATION FILED NOV. 21, 1913.

1,222,974.

Patented Apr. 17, 1917.

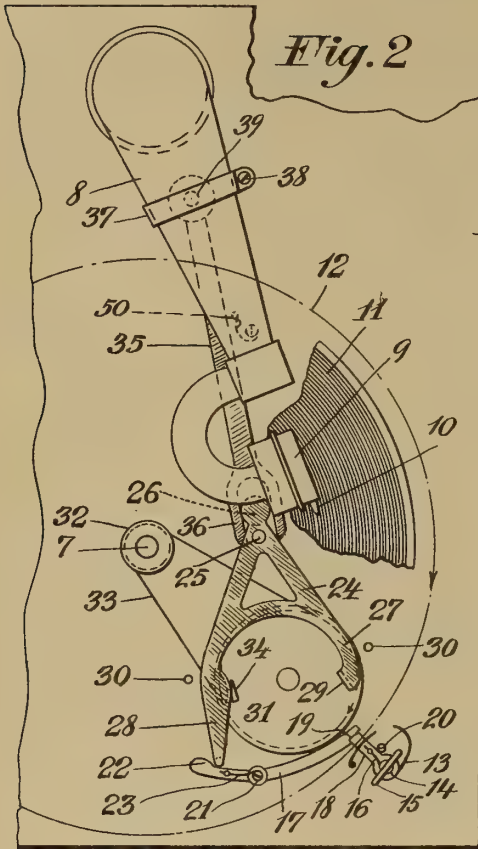


Fig. 2

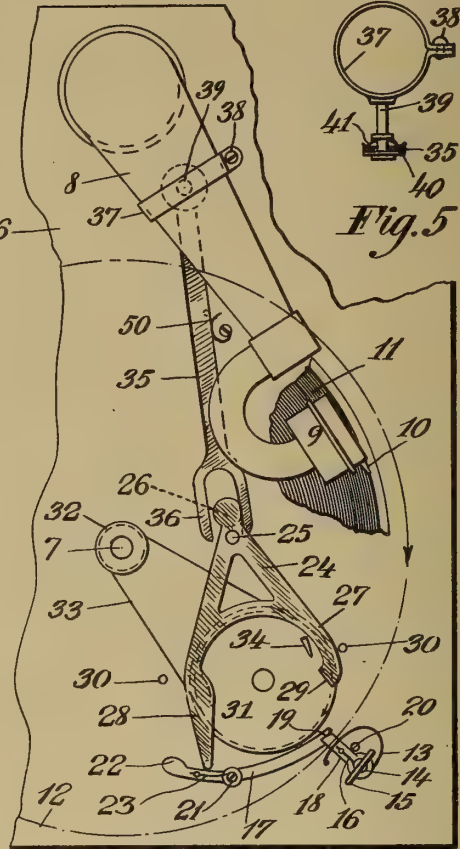


Fig. 5

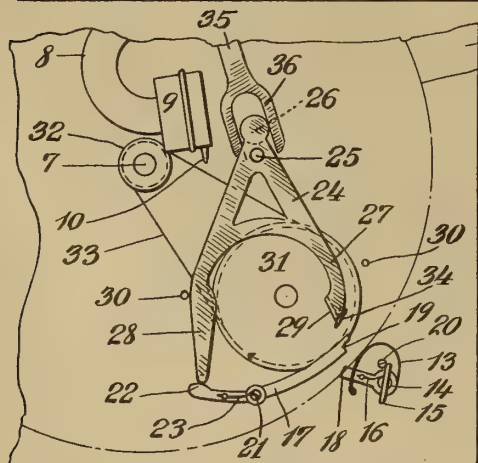


Fig. 3

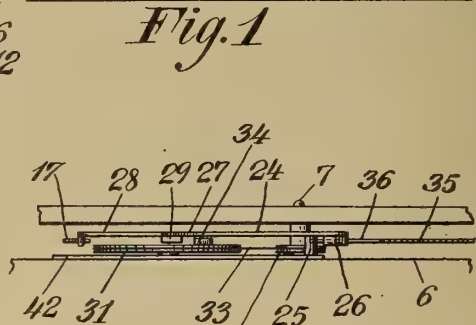


Fig. 4

Witnesses:
A. J. Rucke
H. C. Leard

Aage Nielsen Inventor
By his Attorney
Van E. A. Koringsberg

UNITED STATES PATENT OFFICE.

AAGE NIELSEN, OF NEW YORK, N. Y., ASSIGNOR TO WILLIAM A. CONDON, OF SUMMIT, NEW JERSEY.

AUTOMATIC STOP MECHANISM FOR PHONOGRAPHS.

1,222,974.

Specification of Letters Patent. Patented Apr. 17, 1917.

Application filed November 21, 1913. Serial No. 802,199.

To all whom it may concern:

Be it known that I, AAGE NIELSEN, a citizen of the Danish Monarchy, and a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Automatic Stop Mechanisms for Phonographs, of which the following is a specification.

This invention relates to automatic stop mechanism for phonographs. The object of the invention is to provide a simple and inexpensive mechanically operated brake mechanism for the record turntable so designed, that it will automatically brake the turntable upon the cessation of the sound and so arranged and constructed that no adjustment or setting thereof is necessary for each record. In other words, this invention contemplates a brake mechanism which will automatically brake the turntable irrespective of the length of the record and without requiring any other attention from the operator than the releasing of the brake when a new record is to be played. Other objects will appear as this specification proceeds.

The invention is embodied in a brake mechanism comprising such elements, combinations and arrangements of parts as are hereinafter described and as are illustrated in the drawings in which—

Figure 1 is a plan view of a brake mechanism embodying my invention and showing the same attached to a phonograph with the parts in position at the beginning of the playing of a record. Parts are broken away for the sake of clearness and other well known parts are omitted.

Fig. 2 is a similar view showing an intermediate position of the tone arm, and the brake mechanism in a corresponding position.

Fig. 3 is a fragmentary view showing the parts in the position of braking.

Fig. 4 is a detail side view of parts of the brake mechanism looking from the right in Fig. 1, and

Fig. 5 is a detail view of an attachment and friction device secured to the tone arm. In the drawings the reference numeral 6 represents the cover of the casing of a phonograph. 7 is the turntable shaft driven by the usual spring motor (not shown). 8 is the tone arm carrying the sound box 9 and

the stylus 10. 11 represents a record carried by the turntable 12. The brake mechanism forming the subject of this invention is almost entirely hidden by the turntable being mounted below the latter and upon and above the cover 6. For the sake of clearness, however, the turntable is indicated by a dot and dash line, while the brake mechanism is shown in full lines.

The brake itself is preferably a friction brake and in the form of a coiled spring adapted to take against the edge of the turntable. It is pivoted at 14 and provided with a handle 15 for setting it by the operator. A spring 16 urges the brake in the direction of rotation of the turntable when the brake is released. The brake is held inactive by a tripping lever 17 which engages the brake arm 18 as shown in Figs. 1 and 2, for which purpose the tripping lever is provided with a catch 19, see Fig. 3. 20 is a stop for the brake arm.

The tripping lever is pivoted at 21 and is provided with a cam 22 and a spring 23 which tends to force the catch 19 into engagement with the brake arm to hold the brake inactive. Controlling means are provided for controlling the operation of the brake at the proper time, and the tripping lever 17 presents merely one form of a connecting means between the controlling means and the brake. In this instance the controlling means takes the form of a lever 24 pivoted at 25. To the one side of its pivot the lever 24 carries a downwardly projecting lug 26. To the other side the lever is formed with two arms 27 and 28, the latter of which is adapted to strike the tripping lever cam 22 to operate the tripping lever whereby to release the brake. The arm 27 carries a downwardly projecting cam 29. 30, 30 are stops limiting the oscillations of the controlling lever 24 which is oscillated to the left by a lug 34 on a pulley 31 pivoted on a stud and which is driven from a pulley 32 on the turntable shaft 7 by means of a belt or cord 33.

When the lug 34 during the rotation of the pulley 31 strikes the arm 28, the lever 24 is moved slightly to the left, see Fig. 2. The lever 24 is moved to the right by a bifurcated lever 35. The fork 36 of the lever engages the lug 26 and when the fork is moved to the left, the arm 24 is moved to the right.

The lever 35 is secured to the tone arm 8 as follows, see Fig. 5. 37 is a ring which may be clamped to the tone arm 8 by a screw 38. A post 39 is secured to the ring and carries a fixed disk 40. The lever 35 is pivoted on the post 39 and a spring or other friction device 41 keeps the lever 35 in frictional engagement with the disk 40. When the tone arm 8 moves, the lever 35 moves with it unless the lever meets an obstruction in which case the lever 35 will move with relation to the tone arm.

The tripping lever 17, the pulley 31 and the controlling lever 24 as well as the stops 30 may all be mounted on a base 42 for convenience in attaching the brake to the phonograph. Only Fig. 4 shows this base.

In operation a record 11 is laid upon the turntable, the stylus 10 is set in the record groove at the beginning thereof, the brake is brought into inactive position and the turntable is then rotated by the motor as usual. It will then be seen that during the inward swinging of the tone arm 8, the fork 36 of the lever 35 is also moved inward and consequently the controlling lever 24 is moved to the right which brings the arm 28 into the path of the lug 34 as the latter rotates and also brings the arm 27 out of the path of the lug 34 as seen in Fig. 1. But every time the lug 34 strikes the arm 28, Fig. 2, the controlling lever 24 is again moved to the left and the forked lever 35 is moved to the right or outwardly on the tone arm 8 which is possible because of the friction device 41.

From this it will be clear that so long as the tone arm 8 keeps swinging inwardly, the controlling lever 24 is kept oscillating by the forked lever 35 and the lug 34, and that during this movement the lug 34 never strikes the cam 29. When, however, the tone arm ceases to move, which occurs when the last sound of the record has been reproduced, the controlling lever 24 will no longer be moved to the right by the forked lever 35, but will remain in its leftward position caused by the lug 34, Fig. 2. Consequently, on the following rotation, the lug 34 will strike the cam 29 as shown in Fig. 3, and the controlling lever 24 will be moved still farther to the left and its arm 28 will strike the cam 22 on the tripping lever to trip the latter, which releases the brake which then engages and stops the turntable as explained above.

The parts are preferably so arranged that the lug 34 contacts with the arm 28 while the turntable makes one revolution to guard against irregular or incomplete oscillations of the fork 36, which in many machines swings or oscillates slightly due to imperfect or unsteady movement of the tone arm.

Such imperfect or unsteady movements of the tone arm, which take the form of slight

but continuous oscillations, are caused by the fact that in manufacturing records and talking machines it is practically impossible to make the records so mathematically perfect that the center thereof will accurately coincide with the center of the turntable shaft 7. Again, the central opening in the record is necessarily slightly larger than the diameter of the turntable shaft and in placing the record on the turntable, the record is almost always placed slightly eccentric to the turntable shaft.

It follows, that the movement of the tone arm toward the center of the record or the turntable shaft is not even, but is uneven, and I have observed that the tone arm may oscillate as much as three-thirty seconds of one inch, and this peculiarity in the workings of the machine must be taken into consideration in constructing a mechanism which is partly or wholly controlled by said tone arm.

Therefore, the fork 36 is purposely made wider than the depending lug 26 in order to permit the lever 35 to follow the uneven movements of the tone arm. Further, the operating lever 35 for the same reason must be movably supported on the tone arm, because if rigidly connected to the tone arm, the oscillatory movements of the latter will be communicated to the lever 35, hence to the member 24 and the latter would not operate in response to the regular movements only of the tone arm.

The arm 28 is made long enough so that the lug 34 will contact therewith for nearly a complete revolution of the turntable. If this was not done, the lug 34 would operate the control member 24 prematurely and the result would be that lug 34 might strike lug 29 and trip the brake before the record had been completed.

Thereafter, the tone arm is moved out of the way, the record is removed, a new record laid on the turntable and the brake released by the operator by turning it to the right against the stop 20 whereupon the tripping lever, which is now free of the arm 28, again engages the brake arm 18 and the machine is ready to play a new record.

When the tone arm is brought into starting position, the lever 35 is of course also moved outwardly. This movement would cause the lever 24 to be moved to the left so that the lug 34 during its first rotation would strike the cam 29 and the brake would be applied. To prevent this there is provided a spring 50 so positioned that at the start the lever 35 is kept to the left to hold the cam 29 out of the way of the lug 34 as shown in Fig. 1 and until a few grooves on the record has been reproduced.

It will be seen that the brake will be applied almost immediately after the record has been reproduced, because at the most,

one rotation of the lug 34 can occur before it strikes the cam 29. It will further be apparent that the brake will act irrespective of the length of the record and that no adjusting of the brake mechanism, according to the length of the record is necessary as is the case with most phonograph brake mechanisms in the prior art. It will be noted that the principle of this invention resides in that a brake controlling means, namely the lever 24, is operated by the movements of the swinging member (the tone arm) and the rotating member (the turntable) and that when one of these members (in this instance the tone arm) ceases to operate the controlling means, the latter is caused, by the movement of the other member (in this instance the turntable acting through the rotating lug 34) to actuate the tripping lever which releases the brake.

The brake mechanism as described is very inexpensive to manufacture because nearly all the pieces can be stamped out and only a few screws are necessary to attach it to the machine.

Details in the construction may of course be varied within the scope of the claim.

I claim:—

The combination with a swinging member and a rotating member, a brake for the latter, a brake tripping lever for normally keeping said brake in inactive position, means for actuating said tripping lever to release the brake when said swinging member ceases to move, said means comprising a brake controlling lever, an arm on the latter adapted to engage said tripping lever, an element frictionally mounted on said swinging member and in contact with said brake controlling lever for moving the same in one certain direction, a rotating cam driven by said rotating member for moving said brake controlling lever in the opposite direction and for moving the said arm into direct engagement with said tripping lever to release the said brake to brake the said rotating member when the swinging member ceases to move.

Signed at New York, N. Y., this 15th day of Nov. 1913.

AAGE NIELSEN.

Witnesses:

IVAN KONIGSBERG,
K. G. LE ARD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

AUTOMATIC STOP MECHANISM FOR
SOUND REPRODUCING
MACHINES,

#1,223,041-----R.B.De Vere,
Patented-April 17th, 1917.
Filed-August 7th, 1916.

Fig. 1

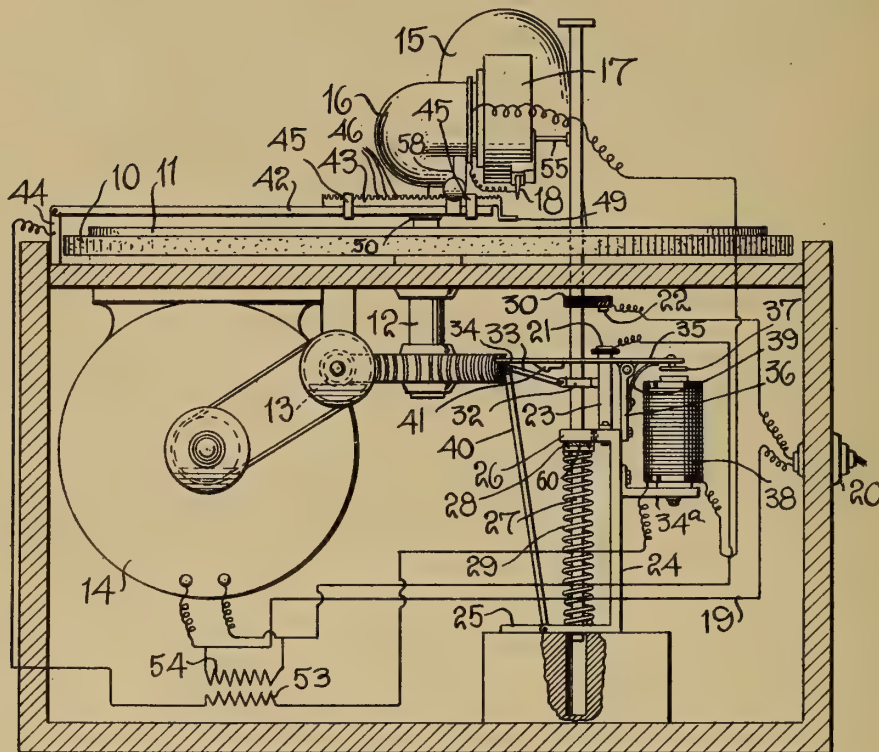
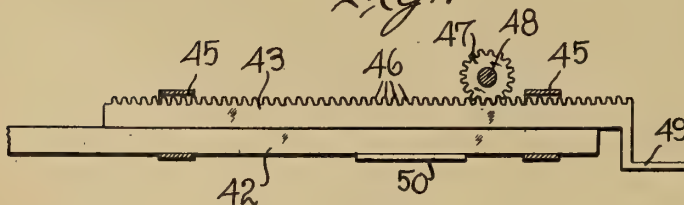


Fig. 7



Inventor

R. B. DE VERE

By *Watson E. Coleman*

Attorney

R. B. DE VERE.

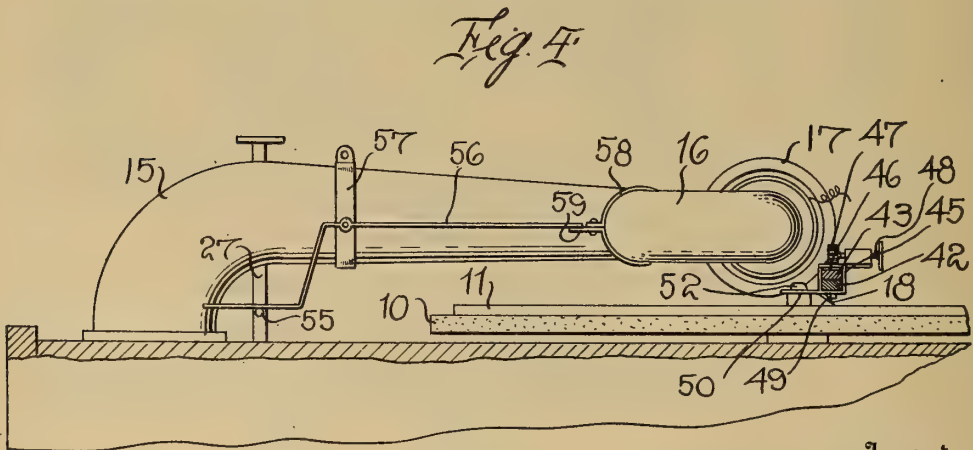
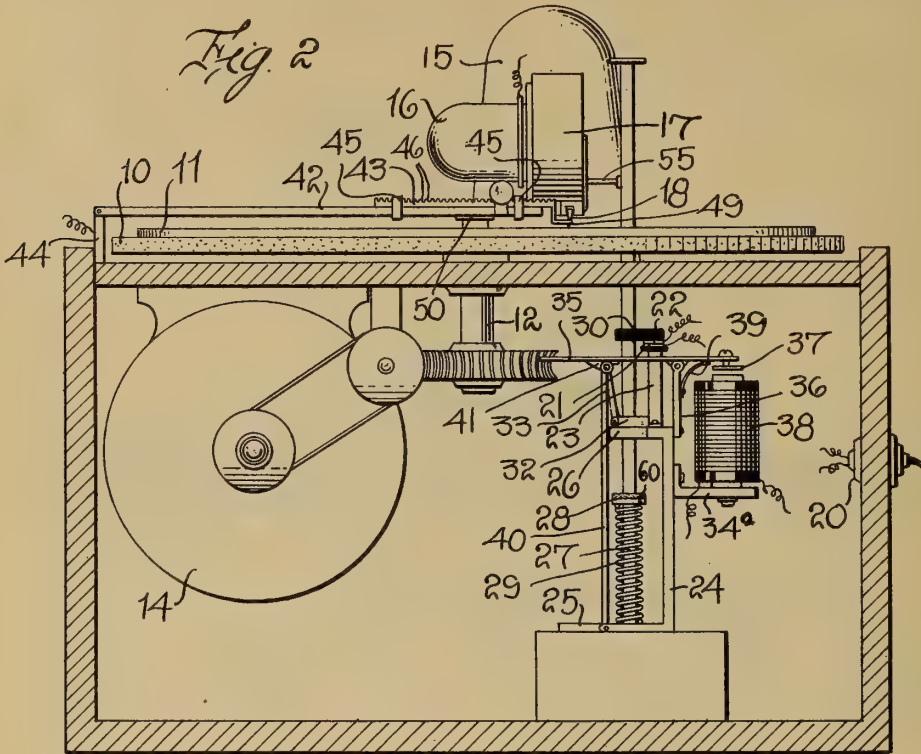
AUTOMATIC STOP MECHANISM FOR SOUND REPRODUCING MACHINES.

APPLICATION FILED AUG. 7, 1916.

1,223,041.

Patented Apr. 17, 1917.

3 SHEETS—SHEET 2.



Inventor

R. B. DE VERE

By *Watson E. Coleman*

Attorney

R. B. DE VERE.

AUTOMATIC STOP MECHANISM FOR SOUND REPRODUCING MACHINES.

APPLICATION FILED AUG. 7, 1916.

1,223,041.

Patented Apr. 17, 1917.

3 SHEETS—SHEET 3.

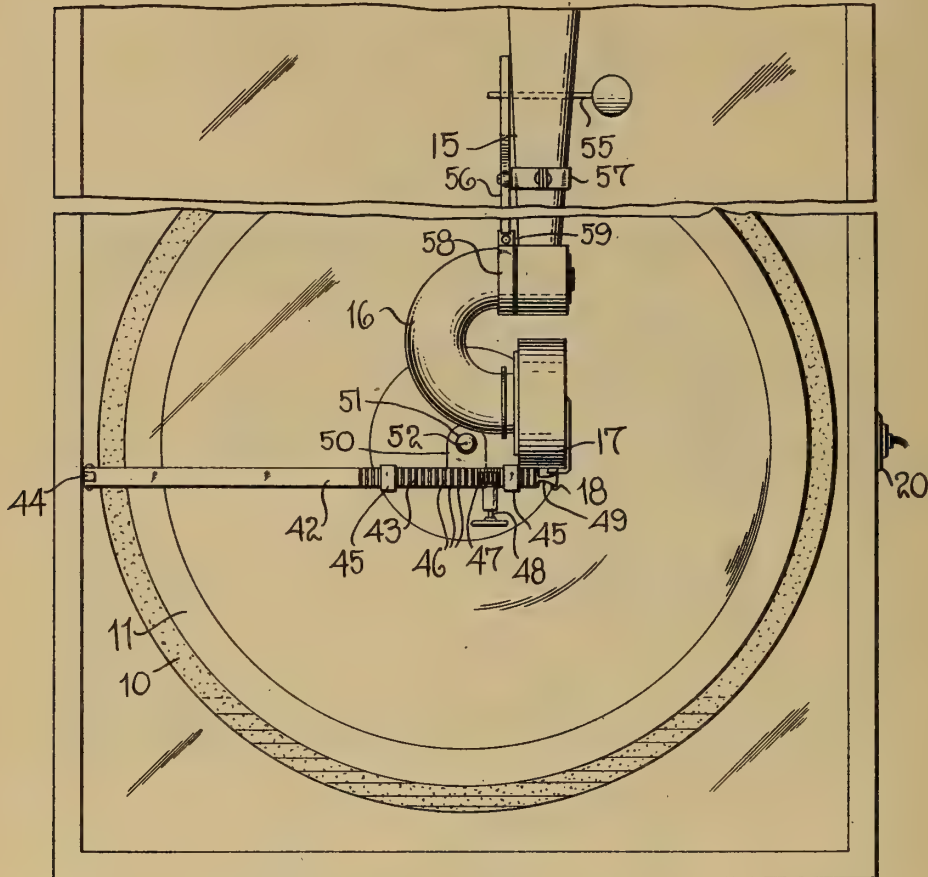


Fig. 3

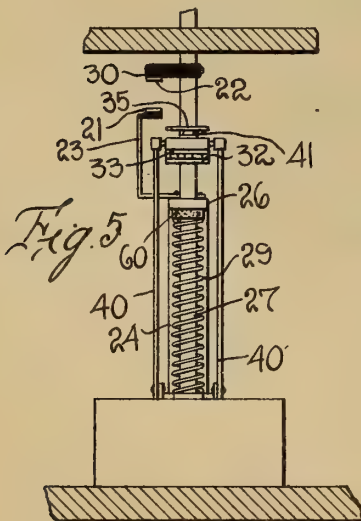


Fig. 5

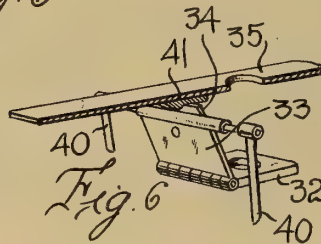


Fig. 6

Inventor

R. B. DE VERE

By *Watson E. Coleman*

Attorney

UNITED STATES PATENT OFFICE.

RAYMOND BRADEN DE VERE, OF SEATTLE, WASHINGTON.

AUTOMATIC STOP MECHANISM FOR SOUND-REPRODUCING MACHINES.

1,223,041.

Specification of Letters Patent.

Patented Apr. 17, 1917.

Application filed August 7, 1916. Serial No. 113,579.

To all whom it may concern:

Be it known that I, RAYMOND B. DE VERE, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Automatic Stop Mechanism for Sound-Reproducing Machines, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to sound reproducing machines and particularly to those sound reproducing machines which are driven by means of an electric motor.

The general object of my invention is to provide means whereby the circuit to the motor may be broken when the record has been entirely played, thus doing away with the necessity of the operator watching or listening to lift the sound box supporting goose neck or the tone arm just before the record is completed so as to remove the stylus from contact with the record disk.

A further object of the invention is to provide means whereby the sound box may be lifted automatically when the tone arm is swung to its innermost position and the record has been completely played and in this connection to provide means for both automatically raising the sound box and breaking the circuit through the electric motor, this means, however, permitting the lifting of the sound box in order to change needles or for any other purpose.

A further object is to provide electrical mechanism for breaking the circuit through the motor and lifting the sound box which includes a low voltage actuating circuit so that even if the operator does complete accidentally this low voltage circuit, the result will not be noticed.

Other objects will appear in the course of the following description.

My invention is illustrated in the accompanying drawing, wherein:

Figure 1 is an elevation of my mechanism applied to a sound reproducing machine, the casing of the machine being shown in section, the view showing the sound box raised and the motor circuit open;

Fig. 2 is a like view to Fig. 1, but showing the motor circuit closed and the sound box lowered;

Fig. 3 is a top plan view of the construction shown in Fig. 1;

Fig. 4 is a fragmentary side elevation of the tone arm, the adjustable arm being in section;

Fig. 5 is a front elevation of the latch mechanism; and

Fig. 6 is a perspective view of the latch mechanism.

Fig. 7 is an elevation of the adjustable arm which carries the contact 49, the straps 45 and the shaft 48 being shown in section.

In the ordinary talking machine and particularly in those talking machines which are driven by means of an electric motor, it is necessary that the sound box should be lifted upon or just before the completion of a record in order that the needle may not scratch over the surface of the record and harm it. Furthermore where talking machines are provided which are energized by an electric motor, the circuit through which is closed by the insertion of a coin, it is necessary to provide some automatic means for stopping the motor at the completion of a record and lifting the sound box so that the tone arm may be shifted back to its original position. The invention to be described provides means for automatically accomplishing this so as to eliminate the necessity of any attention being paid to stopping the motor. In the drawings I have illustrated the essential features of an ordinary talking machine using disk records and operated by an electric motor, it being understood however, that the device is equally applicable to a large variety of machines differing in details. In these drawings 10 indicates the rotatable table upon which the disk record 11 is supported, this rotatable table being driven by means of a spindle 12 operatively connected to a gear wheel 13 in turn driven from an electric motor 14 of any suitable construction. All of these parts may be as usually formed. Coacting with the disk is a tone arm 15 which is also of usual form and I have illustrated this tone arm as being pro-

vided at its extremity with the usual goose neck 16 carrying the sound box 17 provided with a stylus 18.

The motor 14 is connected in a circuit 19 which includes a plug 20 whereby the circuit may be connected to a source of current such as the ordinary house wiring. This circuit 19 also includes the normally spaced contacts 21 and 22. When these contacts are separated the circuit will be broken. The contact 21 is mounted upon but insulated from a spring 23 which in turn is mounted upon a metallic bracket 24 attached to a wooden base 25 or supported in any other suitable manner. The bracket 24 has upper and lower arms. Passing loosely through the base, the lower arm 25 and the upper arm 26 of the bracket is a vertical rod 27 which carries upon it the collar 28 normally disposed just below the upper arm 26 and forming a stop and surrounding the lower end of the rod 27 and bearing against this collar 28 so as to urge the rod 27 upward is a coil spring 29. Mounted upon the rod 27 but offset therefrom is a fiber block or other insulating member 30 which carries the contact 22. Mounted upon the rod 27 is a collar 32 to which is hingedly connected a flat link 33 having thereon a detent 34. Above the collar 32 and link 33 is a latch 35 pivotally mounted upon a support 36 extending upward from the bracket 24. This latch is perforated for the passage of the rod 27. On one end of this latch 35 is an armature 37 coacting with an electro-magnet 38 carried on an arm 34^a on the bracket 24. A spring 39 urges this armature away from the core of the magnet 38. Pivotally connected to the extremity of the link 33 is a link 40 consisting of spaced parallel rods, this link being pivoted to the arm 25. The latch 35 carries a detent 41 with which the detent 34 engages as illustrated clearly in Fig. 6. When in use the rod 27 is depressed, thus swinging the link 33 into a vertical position so as to carry the detent 34 into engagement with the detent 41 as illustrated in Fig. 2. This compresses the spring and as the links 33 and 40 cannot move outward the spring is held in this compressed condition until the latch 35 is released. For the purpose of making and breaking a circuit through the coil 38, I provide an adjustable arm formed of two sections 42 and 43, the section 42 being operatively connected to a post 44 mounted upon the casing of the machine. This post 44 is preferably of electrically conductive material as are the sections 42 and 43 of the adjustable arm. The section 42 I will hereafter refer to as the stationary section and the section 43 as adjustable upon this stationary section. As illustrated, though I do not wish to be limited to this, the section 43 is slidably mount-

ed upon the section 42, passes beneath straps 45 and is formed with teeth 46 engaged by a pinion 47 mounted upon a small shaft 48 supported in bearings carried by the stationary section 42, this shaft being provided with a thumb wheel. It is to be understood that there is sufficient resistance to the shifting of the adjustable arm so that it will not shift accidentally. The extremity of the section 43 carries upon it a contact member 49, the lower end of which is angularly bent into a plane parallel to the plane of the disk 11. The section 42 carries upon it a laterally projecting lug 50 formed with a socket 51 for the reception of the central stud 52 which projects up from the table 10 and is for the purpose of centering the disk 11. The post 44 is electrically connected with the electro-magnet 38 and the other side of this electro-magnet is grounded upon the tone arm 15 in any suitable manner and the stylus of the sound box is electrically connected with the tone arm. It will therefore be seen that when the stylus 18 contacts with the contact 49, that a circuit will be completed through the magnet 38. For the purpose of providing current for this circuit, I preferably connect in the circuit from the post 44 to the tone arm the secondary coil 53 of a step-down transformer whose primary coil 54 is connected in circuit with the wires across the circuit 19. The current ordinarily used for the motor is, we will assume, one hundred and ten volts and the step-down transformer very greatly reduces voltage of the induced current in the circuit including the magnet 38, thus for instance, with one hundred and ten volts in the primary coil 54 there will be from six to twelve volts used in the circuit including the coil 38.

For the purpose of raising the sound box when the playing of a record has been completed in order to thereby lift the needle from its engagement with the record, I provide the upper end of the rod 27 with an arm 55, which arm extends out laterally and beneath the tone arm 15. Where a goose neck is used, as illustrated in the drawings, which is pivoted or swingingly mounted upon the extremity of the tone arm, I provide a lever 56 pivoted intermediate its ends upon the tone arm and shown as pivoted upon a clamp 57 mounted on the tone arm. Mounted upon the goose neck 16 is a clamp 58 having an outwardly projecting arm 59 and the extremity of the lever 56 rests over and upon this arm. It is obvious therefore that when the inner end of the lever 56 is raised the outer end will be depressed and this acting upon the arm 59 will cause the goose neck to be rotated and the sound box raised. Where my mechanism is applied to a talking machine in which no goose neck is used, but in which the tone arm is vertically movable,

then the arm 55 extends directly underneath and engages with the tone arm so that when the arm 55 raises the tone arm will be raised and the lever 56 and clamps 57 and 58 are not used.

In order to eliminate noise when the latch plate 35 is released, I preferably provide a rubber bumper 60 above the collar 28. Contacts 21 and 22 compose the switch that controls the motor. In case the operator wishes to stop the machine before the record is fully played, the reproducer is raised from the record and the arm 15 is swung so as to bring the stylus 18 to any part of the arm 42. The result will be the same as if the record had been fully played. In Fig. 1, the control circuit, that is the circuit including the magnet 38, is cut in back of this switch but in case small lights are to be used in the cabinet, which is a common construction, the circuit should be cut in in front of the switch. This will be obvious to any electrician. I have illustrated one end of the low voltage circuit as grounded on the reproducer arm, but this connection may be made anywhere on the casting that leads to the tone arm or any arrangement may be made which will provide a metallic connection between one end of the low voltage circuit and the stylus of the sound box.

The operation of my invention will be obvious to those skilled in the art. The contact carrying arm composed of the sections 42 and 43 is first lifted with relation to the turn table and the record placed on the table. The contact arm is then returned to its original position with the lug 50 disposed in engagement with the centering stud 52. The adjustable section 43 is then adjusted upon the relatively fixed section 42 so as to bring the contact shoe or member 49 directly over the last grooves on the record, that is the grooves nearest the center of the record. Then the rod 27 is depressed, the rod having a button at its upper end for this purpose, and this depression of the rod 27 carries the member 34 into engagement with the detent 41. When the turn table has acquired the proper speed, the needle is placed on the record in the usual manner. When the record has been entirely played the stylus on the sound box will come in electrical engagement with the contact 49 and a circuit will be completed through the coil 38 drawing down the armature 37 and causing the latch 35 to release the detent 34. The spring 29 will then cause the upward projection of the rod 27 so as to separate the contacts 21 and 22 and break the motor circuit. At the same time the upward movement of the rod 27 will cause the arm 55 to engage with the lever 56 shifting the inner end of this lever upward and rotating the goose neck 16 so as to lift the sound box from the record, or if a machine is used

having no goose neck, then the upward movement of the arm 55 raises the tone arm and the sound box.

The reason for using a low voltage circuit for the contact 49 and the stylus is that the two bare ends of the circuit are exposed above the turn table after the machine has been started and if for some reason or other, the operator wishes to change the record or make some adjustment, this circuit may be accidentally closed through the operator with unpleasant results if the circuit is of high voltage. The closing of this low voltage circuit can hardly be felt.

While I have illustrated what I regard as a thoroughly effective form of my invention, I do not wish to be limited to this as it is obvious that many changes might be made without departing from the spirit thereof.

Having described my invention, what I claim is:

1. The combination with a sound reproducing machine including a sound box and an electric motor for operating the machine, of a spring actuated sound box lifting device and circuit breaker disposed in the motor circuit, a latch holding said lifting device and circuit breaker from operation, and means automatically operable after the motor has operated to a predetermined extent, releasing said latch to thereby cause the simultaneous lifting of the sound box and the breaking of the motor circuit.

2. The combination with a sound reproducing machine including a tone arm, a sound box and stylus, a motor disposed in circuit with a source of energy, a contact member adapted to be disposed in the path of movement of the stylus, a switch in the motor circuit, a switch operating and sound box lifting member normally urged in a direction to open the switch and lift the sound box, means holding said switch actuated and sound box lifting member from movement, said means being disposed in a normally interrupted circuit with the stylus and contact, the engagement of the stylus and contact closing said last named circuit and actuating said switch and sound box lifting member to break the circuit through the motor and simultaneously elevate the sound box.

3. The combination with a sound reproducing machine including a tone arm, a sound box, a stylus thereon and an electric motor for driving the machine and disposed in circuit with a source of energy, of a contact member adapted to be disposed in the path of movement of the stylus and connected in an electric circuit therewith, said circuit being normally interrupted, a switch for breaking the motor circuit including contacts, said contacts being connected in the motor circuit, a sound box lifting mem-

ber carrying one of said contacts, a spring normally urging the sound box lifting member in a direction to separate the contacts and lift the sound box, a latch holding said lifting member against the action of the spring, and electrical means disposed in the second named circuit operating on said latch to release it when the second named circuit is completed by the electrical engagement of the contact member with the stylus.

4. In a sound reproducing machine, a sound box supported for vertical movement, a rotatable record support over which the sound box is movable, means for raising the sound box from the record support comprising a vertically movable member having an arm operatively connected to the sound box, a spring urging the member to a raised position, a latch holding the member lowered, and means for automatically retracting the latch when the sound box is shifted over the record support to a predetermined position.

5. The combination with a sound reproducing machine including a vertically movable sound box and a motor, of spring actuated means for lifting the sound box, a latch holding the spring actuated means against its lifting movement, and means for releasing said latch after the motor has operated to a predetermined extent.

6. The combination with a sound reproducing machine including a sound box and a motor, and means for shifting the sound box laterally, of positively actuated means for lifting the sound box, a latch holding said lifting means out of operation, and means for releasing said latch after the sound box has traveled laterally to a predetermined point.

7. The combination with a sound reproducing machine including a sound box movable laterally and vertically, of a spring actuated sound box lifting device, a latch holding the lifting device out of operation, and electrical means for releasing said latch including an electromagnet and coacting contacts in circuit therewith and with a source of energy, one of said contacts being supported at a predetermined point in the path of movement of the sound box and the other being operatively supported upon the sound box.

8. The combination in a talking machine, of a record supporting table, a tone arm, a sound box thereon carrying a stylus, a motor operatively connected to the table and disposed in circuit with a source of energy, a switch, a latch holding the switch in position to close the circuit through the motor, means for actuating said switch including an electro-magnet, an arm having a contact mounted thereon adapted to be disposed in the path of movement of the stylus, said

contact and the stylus being connected in a normally interrupted circuit, said circuit being closed by the engagement of the stylus with the contact, and means for lifting the sound box comprising a vertically movable member operatively engaged with said sound box and urged to a raised position but held in a lowered position by said latch and released when the latch is released.

9. In a sound reproducing machine, a record support, a sound box and stylus cooperating therewith, an electric motor mounted to drive the support and disposed in circuit with a source of energy, a contact adapted to be disposed in the path of movement of the stylus and electrically connected thereto, a switch in the motor circuit urged to a position to break the circuit, a latch normally holding the switch closed against said urging means, electrically actuated means for releasing said latch and disposed in the circuit with the stylus and contact, and means for energizing the last named circuit including a step-down transformer having its primary coil connected to a source of energy and its secondary coil disposed in the second named circuit.

10. In a sound reproducing machine, a record supporting table, an electric motor operatively connected to the table to rotate the latter and connected in a circuit with a source of energy, a tone arm, a sound box and stylus mounted thereon, the tone arm having movement transversely across the table, an arm pivotally mounted to one side of the table and extending across its face, the arm being made in two adjustable sections, one of said sections carrying a contact member adapted to be disposed in the path of movement of the stylus, said arm being provided with means for engaging the center stud of the table, electrical connections between the contact and the stylus and including the secondary of a step-down transformer and an electro-magnet, a rod extending vertically upward at the side of the table, a spring urging said rod upward, a contact member carried upon the rod, a relatively fixed contact member supported below the first contact member and coacting therewith, said contacts being connected in circuit with a motor and constituting a switch, a spring urging said rod upward to separate the contacts, a pivoted latch adapted to lock the rod in a depressed position, one end of the latch carrying an armature coacting with the electro-magnet whereby to release the latch when the magnet is energized, and a primary coil of the step-down transformer connected to a source of energy.

11. The combination with a sound reproducing machine including a sound box, a record support and a motor for rotating the record support, of means for lifting the

sound box relative to the record support, said means including a vertical rod having operative engagement with the sound box, a spring urging said rod upward, the rod
5 being manually depressible against the force of the spring, a latch holding the rod depressed, and automatic means for releasing said latch when the sound box has

reached a predetermined position with relation to the record support.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

RAYMOND BRADEN DE VERE.

Witnesses:

C. E. REMSBERG,

J. L. BOOTH.

10

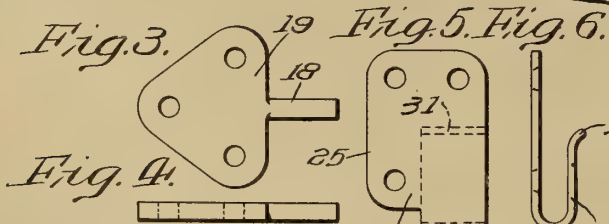
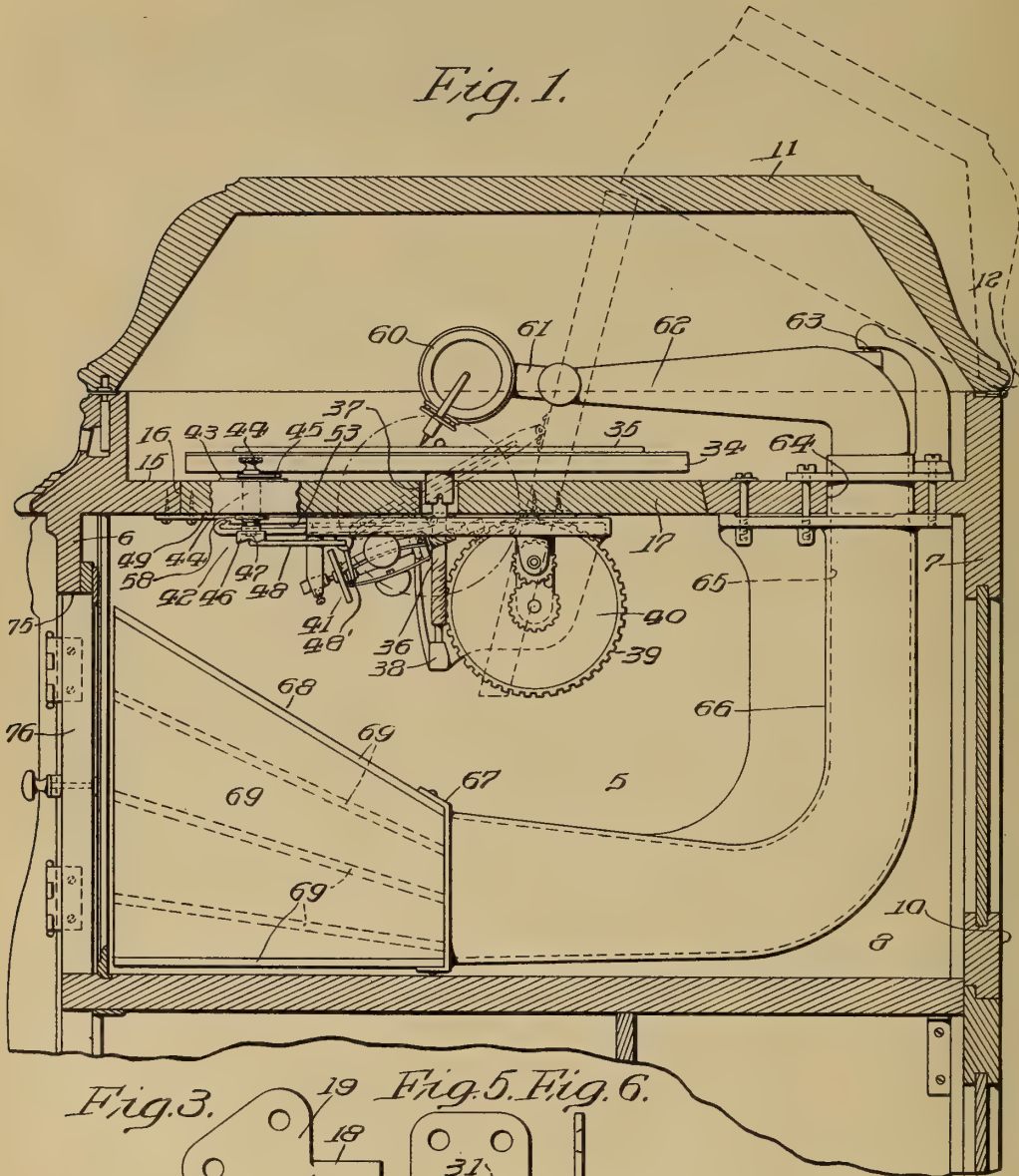
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

TALKING MACHINE,
#1,223,080-----W. D. La Rue,
Patented-April 17th, 1917.
Filed-May 15th, 1914.

W. D. LA RUE,
TALKING MACHINE.
APPLICATION FILED MAY 15, 1914.

1,223,080.

Patented Apr. 17, 1917.
2 SHEETS—SHEET 1.



WITNESSES
H. J. Hartman.
A. J. Gardner.

BY

INVENTOR
William D. LaRue.

Horace Pitt.

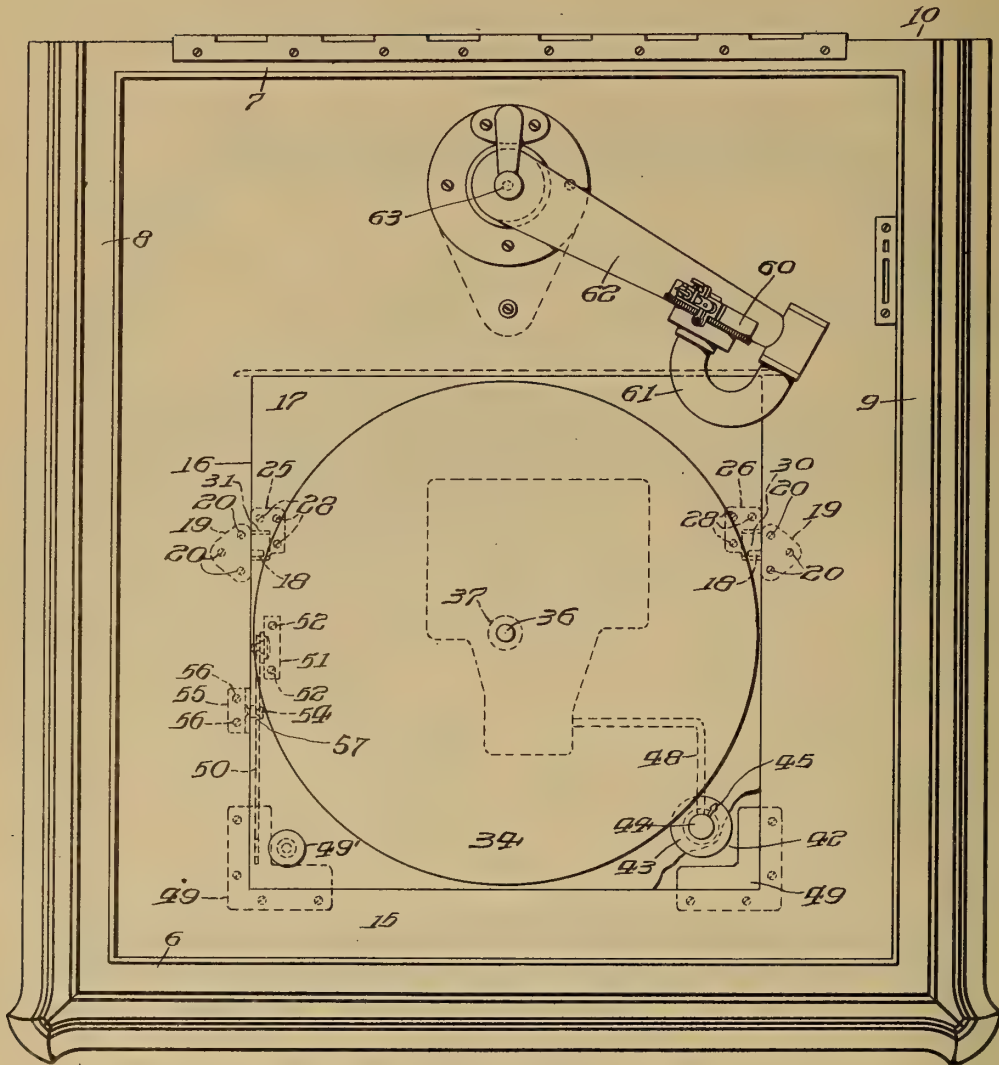
ATTORNEY

W. D. LA RUE.
TALKING MACHINE.
APPLICATION FILED MAY 15, 1914.

1,223,080.

Patented Apr. 17, 1917.
2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

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TALKING-MACHINE.

1,223,080.

Specification of Letters Patent. Patented Apr. 17, 1917.

Application filed May 15, 1914. Serial No. 838,638.

To all whom it may concern:

Be it known that I, WILLIAM D. LA RUE, a citizen of the United States, and a resident of the city of Camden, State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

One object of this invention is to provide in a talking machine including a cabinet, a turntable for supporting records, a motor for rotating the turntable and a tilting motor support or motor board for supporting the motor and the turntable, and in which the motor support may be conveniently tilted or oscillated to swing the motor into a convenient position for inspection, lubrication, adjustment, or repairs, and whereby the motor and its support may be quickly and conveniently removed from the cabinet for any desired purpose.

Further objects of this invention are to provide an improved arrangement of the elements of the motor and the parts cooperating therewith including sound reproducing means and sound amplifying means; and to provide other improvements as will appear hereinafter.

In the accompanying drawings, Figure 1 is a fragmentary vertical central longitudinal section of a talking machine constructed in accordance with this invention; Fig. 2 is a top plan view of the same, but with the covering of the cabinet removed; Figs. 3 and 4 are an enlarged top plan view and an enlarged side elevation of a detail of the same; and Figs. 5 and 6 are an enlarged top plan view and an enlarged side elevation of another detail of the same.

Referring to the drawings, one embodiment of this invention comprises a talking machine including the usual or any suitable body portion 5, substantially rectangular in horizontal section, and including a front vertical wall 6, a back or rear vertical wall 7, and two vertical side walls 8 and 9. Superimposed upon the body 5 is the usual hollow cover 11 which is hinged as at 12 to the upper edge of the rear wall 7. Arranged within the body portion 5 and spaced slightly below the upper edges thereof is a substantially horizontal fixed partition or support 15 which is rigidly secured to the

vertical walls 6, 7, 8 and 9 of the body 10 of the cabinet.

The partition 15 is provided with a rectangular and preferably substantially square opening 16 the surrounding edge walls of which are parallel to the vertical walls of the body portion 5 respectively. This opening 16 is normally closed by a flat rectangular motor support or motor board 17 of substantially the same thickness as and normally arranged in a plane with the partition 15, and is mounted to oscillate about two oppositely disposed alined pivots 18 which are preferably integral with two flat base plates 19 which are rigidly secured to the under side of the partition 15, by screws 20 or in any other suitable manner.

For supporting the motor board 17 upon the pivots 18 in such a manner as to permit of the easy removal of the motor board from the pivots, the motor board is provided upon its under side with two motor bearings 25 and 26, which are arranged to engage the two pivots 18 respectively. Each of these pivot bearings 25 and 26 comprises a flat normally horizontal base plate 27 which is secured in a corresponding recess provided therefor in the under surface of the motor board 17, by means of screws 28, and is provided with an extension 30 integral therewith which curves downwardly therefrom snugly around the front side of the corresponding pivot 18 in a semi-cylindrical form and then projects rearwardly in a direction parallel to the base plate 27 and terminates in the rear of the pivot in a downwardly curved end 31. The outer edges of the two extensions 30 of the pivot bearings 25 and 26 are preferably arranged in vertical alignment with the corresponding side edges of the motor board 17.

The pivots 18 and pivot bearings 25 and 26 are preferably arranged to locate the axis of oscillation of the motor board, which coincides with the longitudinal axis of the pivots 18, in a line spaced slightly below the motor board 17 and parallel to the front and rear edges thereof and arranged between the center of the motor board and the rear edge thereof, and preferably nearer the center than the rear edge.

Arranged centrally above the motor board

17, and in a plane substantially parallel thereto is a circular turntable or rotary record support 34 for supporting a disk sound record 35 and is detachably connected to and carried by the upper end of a turntable spindle 36 and is held against longitudinal movement with respect thereto in either direction by any well-known or suitable means. The motor board 17 is preferably only slightly larger in diameter than the turntable, thus permitting of the free oscillation of the motor board without unnecessarily increasing its weight. The spindle 36 projects downwardly through an aperture 37 provided therefor centrally through the motor board 17 and is arranged to rotate about an axis fixed with respect to the motor board and is held against longitudinal movement in bearings 38 depending from the motor board.

For rotating the turntable spindle 36, a motor 39 is arranged beneath and detachably secured to the motor board 17. The motor shown in this connection includes one or more spring barrels 40 which are preferably arranged in the rear of the vertical spindle 36 about a horizontal axis extending transversely of the cabinet and parallel to the front edge of the motor board, and which operate in a well-known manner to rotate the turntable spindle.

The motor 39 is provided with a governor 41 of any well-known fly-ball type or suitable construction which is preferably arranged to be driven from the turntable spindle 36 and to project forwardly therefrom. The speed of the turntable may be adjusted by any well-known or suitable speed regulating device 42 which is preferably located in the front right hand corner of the motor board. This regulating device 42 is preferably of the well-known construction illustrated in the U. S. Patent No. 1,040,522, issued October 5th, 1912, comprising an index plate 43 fixedly clamped against the upper surface of the motor board 17, a rotatable spindle 44 extending through the index plate and through the motor board, an index or pointer 45 secured to the upper end of the spindle to cooperate with the index plate 43, a cam 46 longitudinally adjustable on the lower end of the spindle but held against rotation with respect thereto, and an adjusting screw 47 threaded longitudinally into the lower end of the spindle for adjusting the cam 46 longitudinally of the spindle, the cam 46 being arranged to engage slidably against the outer end of a crank arm 48 which actuates the friction pads 48' of the governor 41. It is to be understood, however, that this invention is not limited to the use of any specific speed regulator, as any suitable form may be used, although it is evident that by the specific arrangement and combination of the specific speed regulator

with the tilting motor board the adjustment of the speed regulator by means of the screw 47 is facilitated.

The arrangement of the parts carried by the motor board 17 is such that the combined weights of these parts tend to swing the front edge of the motor board downwardly when the motor board is in a horizontal position and to swing the front edge of the motor board forwardly and downwardly when the front edge of the motor board is in any position between its normal horizontal position as shown in full line in Fig. 1, and an approximately vertical position as shown in dotted lines in Fig. 1, or in the latter position.

To hold the motor board in its normal horizontal position against the action of gravity, a flat horizontal bracket 49 is secured to the under surface of the horizontal partition at each of the front corners of the rectangular opening 16 through the partition so as to project beneath the motor board and prevent this front edge from swinging downwardly below the lower horizontal position. A knob 49' may be secured to the upper surface of the front portion of the motor board 17 and preferably in the front left hand corner thereof for the convenient operation of the board.

For supporting the motor board in an approximately vertical position or in an inverted position slightly inclined upwardly and rearwardly from the pivots 18, as shown in dotted lines in Fig. 1, for convenience in inspecting, lubricating, or adjusting the motor or its governor, a flat elongated supporting bar 50 is pivotally connected at one end to a plate 51 rigidly secured by two screws 52 to the under surface of the motor board at a point approximately midway between the front and rear edges of the motor board and adjacent the left hand side of the motor board, the supporting bar 50 being preferably arranged to swing in a substantially vertical plane substantially parallel to and spaced slightly inwardly from the left hand edge of the motor board. The supporting bar 50 extends forwardly from the plate 51 and is provided with a longitudinal slot or aperture in which engages a horizontal pin or stop 54 which projects rigidly from a plate 55 rigidly secured by screws 56 to the under side of the partition 15 the walls of the slot 53 preferably engaging slidably in an annular groove 57 provided therefor in the pin 54. The front end of the supporting bar 50 is provided with an internal recess 58 which opens downwardly into the slot 53 and which is adapted to receive the pin 54 to hold the motor board in approximately vertical position as indicated in dotted lines in Fig. 1. When the motor board is in the latter position the portion of the motor board above its pivots 18 tends to

swing forwardly under the action of gravity but is held against forward movement by the supporting bar 50, and when in this position the motor board may be released by

5 lifting the front end of the supporting bar and permitting the supporting bar to slide forwardly over the pin 54.

The motor board 17 together with the motor 39 may be conveniently removed from the cabinet merely by tilting the motor board into an approximately vertical position, then disconnecting the supporting bar 50 from the motor board by removing the two screws 52, and then lifting the motor board vertically from the pivots 18, the pivot bearings 25 and 26 being so constructed, as hereinbefore described, to permit of the removal of the motor board in this manner.

20 For reproducing and amplifying sounds, a sound box or sound reproducer 60 of any well-known or suitable construction is arranged above the record support 34 to cooperate with a sound record 35 upon the support. This sound box 60 is connected to and communicates with the outer end of a short tube 61 the other end of which is pivotally connected to and communicates with the smaller end of a tubular tapering sound box arm 62 to swing with respect thereto about a horizontal axis and to communicate therewith. The sound box arm 62 extends rearwardly from the sound box 60 and is pivotally superimposed or mounted upon and carried by the rear portion of the partition 15, in a well-known manner, to swing on a pivot 63 in a predetermined substantially horizontal path about a fixed vertical axis which is substantially coincident with the longitudinal axis of the larger end of the sound box arm. Said sound box arm is curved downwardly and communicates through an aperture 64 in the partition 15 with the upper end of a passage 65 through a rigid hollow bracket 66 rigidly secured to the under surface of the partition 15. The hollow bracket 66 extends downwardly in the rear of the motor 39 from the partition 15 and then curves forwardly and terminates in a forwardly flaring transversely rectangular socket 67 in which is secured a hollow forwardly flaring body 68 comprising a plurality of forwardly diverging sounding boards 69 forming the delivery end of a sound amplifier, the neck of which is formed by the bracket 66, and which is preferably out of contact with any portion of the cabinet except at the upper end of the bracket 66. The front wall of the cabinet is provided with a rectangular opening 75 controlled by one or more hinged doors 76, and arranged to receive sounds from the delivery end of the sound amplifier and to deliver the same outwardly from the cabinet.

65 In the operation of this improved device,

the motor board 17 is normally maintained in a horizontal plane with its front corners resting upon the brackets 49, and when it is desired to tilt the motor board about the pivots 18, the sound box 60 and sound box arm 62 are swung laterally out of the path of the motor board and the front portion of the motor board is raised by means of the handle 49'. It is to be noted that the tilting of the motor board 17 may be easily effected as the parts carried by the board are so arranged as to nearly balance the board about its pivots 18. It is also to be noted that the motor board may be tilted into an inverted inoperative position while the cover 11 is in the usual open inclined position, as shown in dotted lines in Fig. 1, and without requiring an excessive amount of free space below the horizontal partition 15. It is evident that when the motor board is in its tilted inoperative position, all parts of the motor and its governor, including the adjusting screw 47 of the speed controller will be conveniently accessible.

Although only a single form has been shown in which this invention may be embodied, it is to be understood that the invention is not limited in its application to the specific construction illustrated, but might be embodied in various forms without departing from the spirit of the invention or the scope of the appended claims.

Having thus fully described this invention, I claim and desire to protect by Letters Patent of the United States:

1. In a talking machine, the combination of a casing, a partition, a motor board, said partition and said motor board dividing said casing into an upper and a lower compartment, a motor mounted on said motor board, an amplifier in said casing below said motor, and a swinging arm arranged to swing over said motor board, said motor board being pivoted at intermediate points of its opposite edges to said partition on a transverse axis located to one side of the center of gravity of said motor board and the parts carried thereby to turn to a semi-inverted position facing a side of said cabinet, said motor and motor board in turning upon its pivots, swinging clear of said amplifier and swinging clear of said swinging arm when said arm is in one position.

2. The combination of a casing, a substantially horizontal partition, a motor board, said partition and said motor board dividing said casing into an upper and a lower compartment, said motor board being pivoted to turn with respect to said casing, said pivoting means comprising a pair of aligned studs secured respectively adjacent opposite inner side edges of said partition at corresponding intermediate points thereof, a pair of supporting members secured respectively adjacent the opposite side edges of

said motor board and each provided with a slot extending parallel to said motor board and open toward the rear edge of said motor board, said studs being respectively in
5 pivotal engagement with the closed ends of said supports when said motor board is substantially horizontal and while said motor board is being swung on said studs as pivots, said slots providing means for permit-

ting the removal or withdrawal of said motor board from said partition and of said studs from engagement with said members.

In witness whereof, I have hereunto set my hand this 12th day of May, A. D., 1914.

WILLIAM D. LA RUE.

Witnesses:

HARRY COBB KENNEDY,
CHARLES F. WILLARD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

REPEATING DEVICE
FOR PHONOGRAPHS,

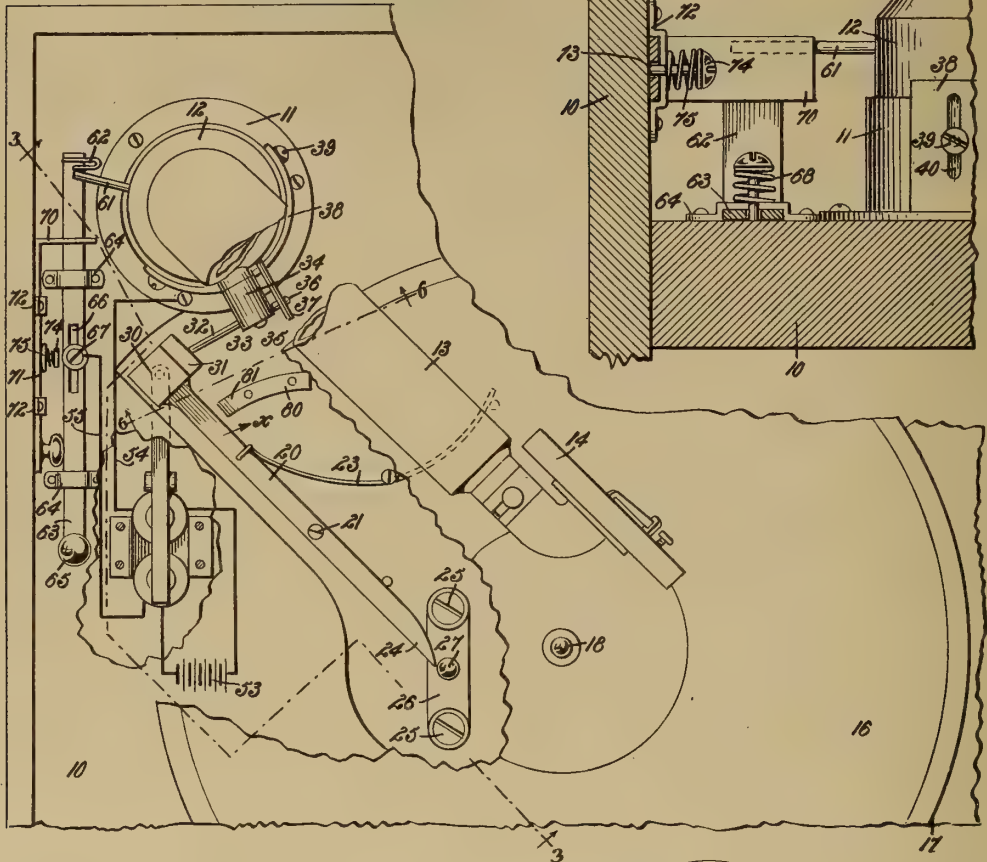
#1,223,149-----W.E.Cleveland,
Patented-April 17th, 1917.
Filed-April 22nd, 1916.

W. E. CLEVELAND.
REPEATING DEVICE FOR PHONOGRAPHS.
APPLICATION FILED APR. 22, 1916.

1,223,149.

Patented Apr. 17, 1917.

Fig. 1—



3 SHEETS—SHEET 1.
Fig. 5—

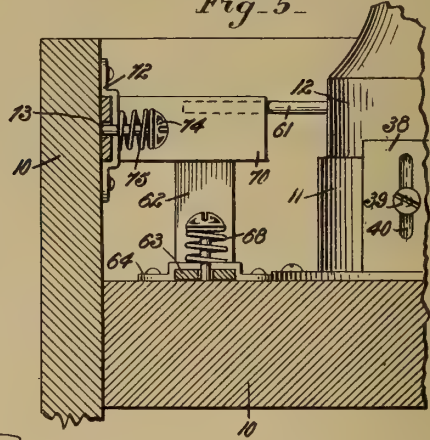
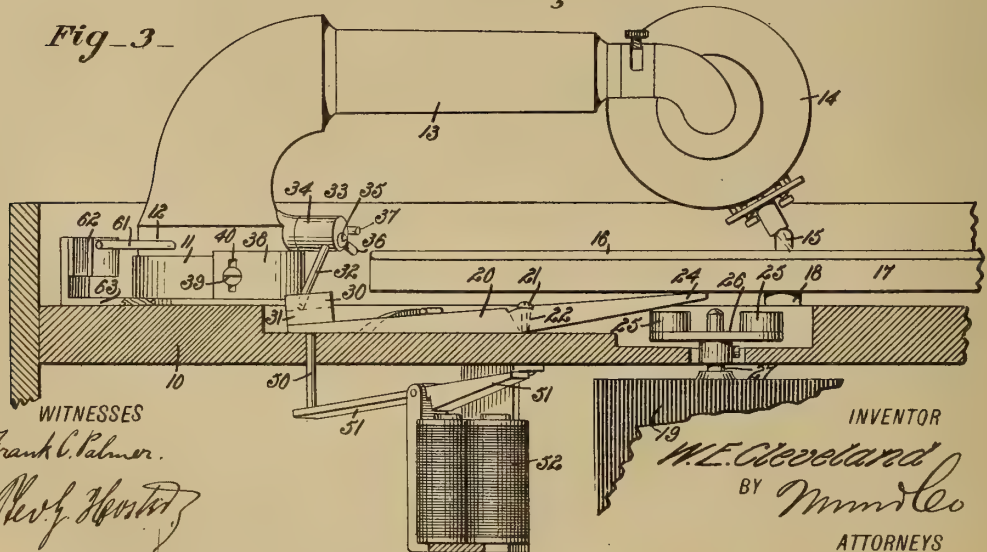


Fig. 3—



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 REPEATING DEVICE FOR PHONOGRAPHS.
 APPLICATION FILED APR. 22, 1916.

1,223,149.

Patented Apr. 17, 1917.

3 SHEETS—SHEET 2.

Fig. 2—

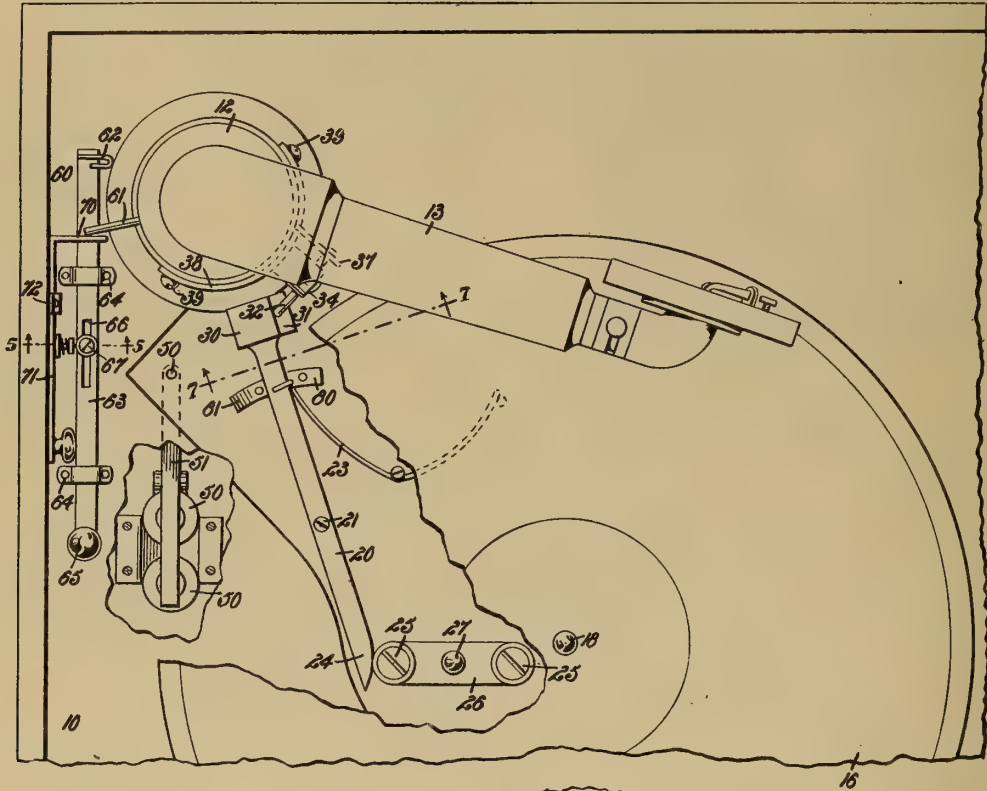
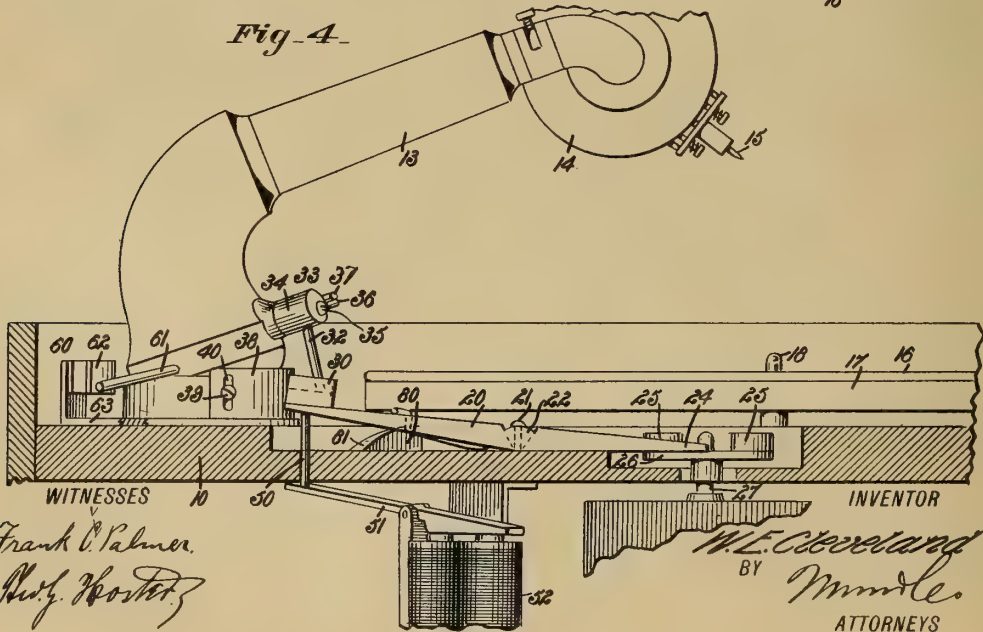


Fig. 4—



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 APPLICATION FILED APR. 22, 1916.

1,223,149.

Patented Apr. 17, 1917.

3 SHEETS—SHEET 3.

Fig- 6-

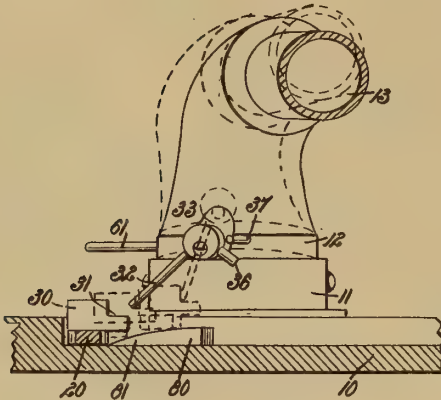


Fig- 7-

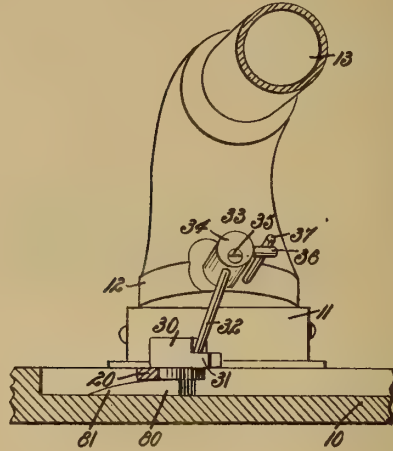


Fig- 8-

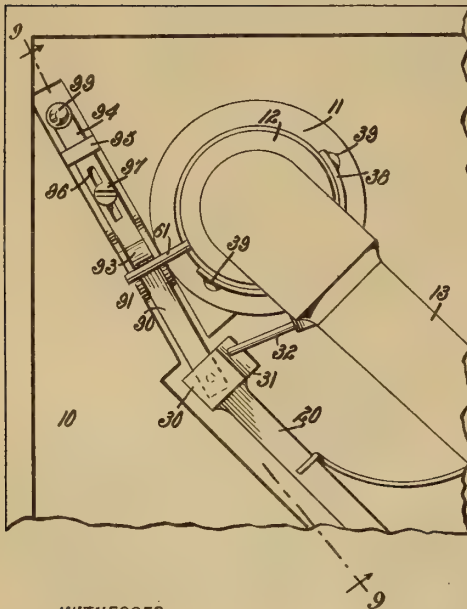
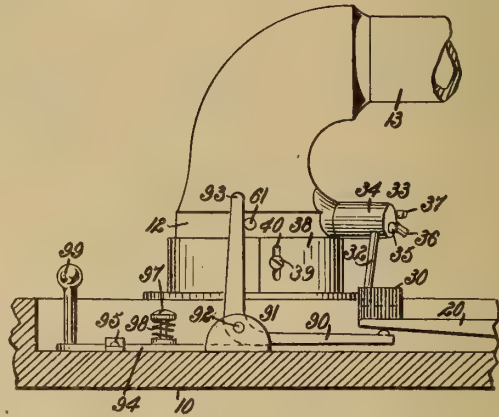


Fig- 9-



WITNESSES

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 May Hester.

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UNITED STATES PATENT OFFICE.

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REPEATING DEVICE FOR PHONOGRAPHS.

1,223,149.

Specification of Letters Patent.

Patented Apr. 17, 1917.

Application filed April 22, 1916. Serial No. 92,997.

To all whom it may concern:

Be it known that I, WILLARD E. CLEVELAND, a citizen of the United States, and a resident of Fall River, in the county of Bristol and State of Massachusetts, have invented a new and Improved Repeating Device for Phonographs, of which the following is a full, clear, and exact description.

The invention relates to phonographs of the disk record type, and its object is to provide a new and improved repeating device which is very simple and durable in construction; easily set for various sized disks and arranged to automatically swing the tone arm upward at the time the stylus reaches the end of the sound groove to lift the stylus out of the said groove, to then swing the tone arm outwardly and then downward into active position relatively to the record to engage the stylus with the beginning of the sound groove.

In order to produce the desired result use is made of a normally inactive cam lever mounted to swing up and down and sidewise, the cam end of the said lever being adapted to engage the tone arm, actuating means controlled by the tone arm to swing the cam end and with it the tone arm upward, and the other end of the lever downward at the time the stylus reaches the end of the sound groove, and continually driven means adapted to engage the lowered other end of the said cam lever to impart a swinging motion to the same to swing the raised tone arm outward.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a plan view of the repeating device as applied to a phonograph of the disk record type, portions of the phonograph being broken out and the parts being in position at the time the stylus reaches the end of the sound groove;

Fig. 2 is a similar view of the same with the parts in position at the time the stylus is at the beginning of the sound groove;

Fig. 3 is a cross section of the same on the line 3—3 of Fig. 1;

Fig. 4 is a similar view of the same with the parts in position at the time the tone arm is raised and returning to outer position;

Fig. 5 is an enlarged sectional side elevation of the switch mechanism, the section being on the line 5—5 of Fig. 2;

Fig. 6 is a sectional side elevation of part of the repeating device, the section being on the line 7—7 of Fig. 2;

Fig. 7 is a similar view of the same with the parts in the position shown in Fig. 4;

Fig. 8 is a plan view of a modified form of the repeating device as applied; and

Fig. 9 is a cross section of the same on the line 9—9 of Fig. 8.

On the frame 10 of a phonograph of the disk record type is held a bearing 11 for the base 12 of the tone arm 13 to swing on, and the said tone arm 13 carries the usual sound box 14 provided with a stylus 15 adapted to engage the record 16 held on top of the revoluble platform 17. The platform 17 is mounted on a shaft 18 forming part of a motor 19 of any approved construction, preferably a spring motor mounted on the frame 10. On the top of the frame 10 below the platform 17 is arranged a cam lever 20 fulcrumed on a pivot 21 attached to the frame 10, the pivotal connection being such that the lever can swing up and down and sidewise by providing the lever with a V-shaped aperture 22 through which extends the pivot 21. The lever 20 is pressed on by a spring 23 attached to the frame 10 to normally hold the cam lever in the position shown in Figs. 1 and 3. The forward end 24 of the lever 20 is adapted to be engaged by either of two friction rollers 25 mounted on the top of an arm 26 secured on a shaft 27 forming part of the motor 19, but rotating at a slower speed than the shaft 18 carrying the platform 17. Normally the outer end 24 of the cam lever 20 extends above the friction rollers 25 so that the latter do not affect the cam lever until a swinging motion is given to the said cam lever to move the end 24 into the path of the rollers 25. When this takes place a swinging motion is given to the cam lever 20 to swing the latter from the normal in-

active position shown in Fig. 1 into the position shown in Fig. 2.

The rear end of the cam lever 20 is provided on its top with a cam 30 having a step-like portion 31 at the right-hand side, that is, toward the tone arm 13. The cam 30 is adapted to engage with its step 31 one arm 32 of the bell crank lever 33 having a hub 34 mounted eccentrically on a pivot 35 attached to the base 12 of the tone arm 13, as plainly illustrated in the drawings. The other arm 36 of the bell crank lever 33 is adapted to engage the under side of a pin 37 projecting from the base 12 of the tone arm 13. Normally the arm 36 is a distance below the pin 37 but when a swinging movement is given to the bell crank lever 20 in the direction of the arrow α , as shown in Fig. 1, then the step 31 engages the end of the arm 32 and imparts a swinging motion to the bell crank lever 33 whereby the arm 36 engages the pin 37 to swing the tone arm 13 upward on further movement of the bell crank lever 20 in the direction of the arrow α so that the stylus 15 is lifted out of the end of the sound groove of the record 16 and further movement of the lever 20 in the direction of the arrow α causes the tone arm 13 to swing outward to start in position. The hub 34 rides on the upper edge of a segmental plate 38 held vertically adjustable on the bearing 11 by screws 39 extending through vertical slots 40 in the plate 38, the screws 39 screwing in the bearing 11. By the arrangement described the bell crank lever 33 always returns to proper position after the tone arm 13 and the cam lever 20 have returned to normal position.

The under side of the cam end of the cam lever 20 is engaged by a pin 50 mounted to slide up and down in the frame 10 resting on the free end of an armature lever 51 of a pair of electromagnets 52 connected with a battery or other source of electrical energy 53. Normally the electromagnets 52 are de-energized and the armature lever 51 is in the position shown in Fig. 3, but when the electromagnets 52 are energized then the armature lever 51 is attracted and the pin 50 is raised whereby an upward swinging movement is given to the rear end of the cam lever 20 so that the forward end 24 moves into the path of the rollers 25, as previously explained. The electromagnets 52 are controlled from the tone arm 13 and for this purpose use is made of an electric switch 60 arranged as follows: On the base 12 of the tone arm 13 is secured a contact arm 61 adapted to move into engagement with a spring contact 62 held on the rear end of a slide 63 mounted to slide in suitable bearings 64 arranged on the frame 10. The slide 63 is provided with a suitable handle 65 and with a slot 66 through which extends a

screw 67 screwing in the frame 10. On the screw 67 is coiled a spring 68 (see Fig. 5) which bears on the slide 63 to hold the latter against accidental movement. The circuit wires 54 and 55 for the circuit of the electromagnets 52 connect with the bearing 11 and consequently with the base 12 of the tone arm 13 and with the pin 67 to close the electric circuit whenever the arm 61 engages the spring contact 62. When the tone arm 13 is in outermost position, as shown in Fig. 2, then the contact arm 61 is a distance from the contact spring 62 but when the stylus reaches the inner end of the sound groove on the record 16 the arm 61 moves in engagement with the contact spring 62 thus closing the circuit for the electromagnets 52 to energize the latter. It will be noticed that the slide 63 can be adjusted to move the contact spring 62 nearer to or farther from the contact arm 61 thus allowing adjustment for records of different sizes, it being understood that in using the repeating device the user engages the stylus with the end of the sound groove on the record 16 and then shifts the slide 63 so that the spring 62 is in contact with the arm 61. The tone arm 13 is then swung outward and the stylus 15 engaged with the beginning of the sound groove to play the music of the record. When the stylus reaches the end of the sound groove the arm 61 makes contact with the spring contact 62 to close the circuit with a view to energize the electromagnets 52. The outward swinging movement of the tone arm 13 is preferably limited by a stop 70 at the end of a slide 71 mounted to slide in bearings 72 attached to the frame 10. The slide 71 is provided with a slot 72 through which extends a pin 74 on which is coiled a spring 75 bearing on the slide 71 so as to hold the latter in adjusted position.

On the top of the frame 10 and in advance of the cam lever 20 is secured a plate 80, the left-hand end 81 of which is preferably beveled for the lever 20 to ride up onto the plate 80 at the time a swinging motion is given to the said cam lever 20 by the corresponding roller 25. By this arrangement the cam end of the lever 20 remains in raised position at the time the friction roller 25 leaves the end 24 of the cam lever. When this takes place the cam lever 20 is returned immediately to its normal position by the action of the spring 23, that is, prior to the other friction roller 25 reaching the free end 24 of the cam lever 20. It is understood that the spring 23 bears down on the rear end of the cam lever 20 so as to hold the latter normally in inactive position, as shown in Figs. 1 and 3.

The operation is as follows:

After the record 16 has been placed in position on the platform 17 then the operator

swings the tone arm 13 inward until the stylus 15 is at the inner end of the sound groove of the record 16. The operator now adjusts the slide 63 so as to engage the contact spring 62 with the contact arm 61. The tone arm 13 is then swung outward by the operator until the stylus is at the beginning end of the sound groove, and the operator now adjusts the slide 71 so that the stop 60 is in engagement with the contact arm 61. The several parts of the repeating device are now in the inactive position shown in Fig. 1 and remain so until the stylus reaches the inner end of the sound groove, and when this takes place the contact arm 61 makes contact with the contact spring 62 to close the circuit for the electromagnets 52. The armature 51 is now attracted thus raising the pin 50 and with it the rear end of the cam lever 20 to swing the front end 24 thereof into the path of the next oncoming friction roller 25. This friction roller 25 in engaging the end 24 imparts a swinging motion to the cam lever 20 in the direction of the arrow x so that the step 31 of the cam 30 engages the arm 32 of the bell crank lever 33 and imparts a short swinging motion to the same until the arm 36 engages the pin 37 after which the tone arm 13 is swung upward by the further movement of the cam lever 20 in the direction of the arrow x . Thus the stylus is lifted out of the sound groove and further movement of the cam lever 20 in the direction of the arrow x causes the bell crank lever to bodily swing the tone arm 13 outward until the arm 61 abuts against the stop 70. It is understood that when the tone arm 13 begins to swing outward the contact between the arm 61 and the spring 62 is broken thus breaking the electric circuit for the electromagnets 52 for the latter to release the armature lever 51. The pin 50 now returns to lowermost position and the bell crank lever 20 is returned to its normal position by the action of its spring 23 as soon as the acting friction roller 25 leaves the end 24 of the bell crank lever. The several parts of the repeating device are now again in normal position and the stylus again travels in the sound groove thus repeating the music, when the above described operation is repeated as soon as the stylus reaches the inner end of the sound groove.

In the modified form shown in Figs. 8 and 9, the cam end of the cam lever 20 is controlled by one arm 90 of a bell crank lever 91 fulcrumed at 92 on the frame 10 and having its upwardly extending arm 93 extending into the path of the pin 61. Thus when the tone arm 13 reaches its innermost position then the pin 61 engages the arm 93 of the bell crank lever 91 thus imparting a swinging motion to the said bell crank

lever whereby the arm 90 swings the cam end of the cam lever 20 upward, the same as above described in reference to the pin 50 controlled by the armature lever 51 of the electromagnets 52. The pivot 92 of the bell crank lever 91 is mounted on a slide 94 mounted to slide in suitable bearings 95 arranged on the frame 10. The slide 94 is provided with a slot 96 engaged by a pin 97 on which is coiled a spring 98 bearing on the slide 94 to hold the latter in the adjusted position. The rear end of the slide 94 is provided with a handle 99 under the control of the operator for shifting the slide 94 with a view to move the arm 93 of the bell crank lever 91 into the desired position relatively to the pin 61 according to the size of the record used at the time.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A repeating mechanism for phonographs, comprising a normally inactive cam lever mounted to swing up and down and sidewise, the cam end of the lever being adapted to engage the tone arm, means to impart an upward swinging movement to the cam end of the lever, and continually driven means adapted to engage the other end of the said lever at the time the cam end is raised to swing the cam lever sidewise.
2. A repeating mechanism for phonographs, comprising a normally inactive cam lever mounted to swing up and down and sidewise, the cam end of the said lever being adapted to engage the tone arm, actuating means controlled by the tone arm to swing the cam end and with it the tone arm upward and the other end of the lever downward at the time the stylus reaches the end of the sound groove, and continually driven means adapted to engage the lowered other end of the cam lever to impart a swinging motion to the same to swing the raised tone arm outward.
3. A repeating mechanism for phonographs, comprising a normally inactive cam lever mounted to swing up and down and sidewise, a bell crank lever fulcrumed on the base of the tone arm, a projection on the tone arm base and adapted to be engaged by one arm of the said bell crank lever, the other arm of the bell crank lever being adapted to be engaged by the cam end of the said lever, actuating means controlled by the tone arm to swing the cam end of the cam lever upward and the other end downward at the time the stylus reaches the end of the sound groove, and continually driven means adapted to engage the lowered end of the cam lever to impart a swinging motion to the same to swing the raised tone arm outward.
4. A repeating mechanism for phono-

graphs, comprising a normally inactive cam lever mounted to swing up and down and sidewise, a bell crank lever fulcrumed on the base of the tone arm, a projection on the tone arm base and adapted to be engaged by one arm of the said bell crank lever, the other arm of the bell crank lever being adapted to be engaged by the cam end of the said lever, actuating means controlled by the tone arm to swing the cam end of the cam lever upward and the other end downward at the time the stylus reaches the end of the sound groove, continually driven means adapted to engage the lowered end of the cam lever to impart a swinging motion to the same to swing the raised tone arm outward, and a spring pressing the said cam lever to return the latter to normal inactive position.

5. A repeating mechanism for phonographs, comprising a normally inactive cam lever mounted to swing up and down and sidewise, a bell crank lever fulcrumed on the base of the tone arm, a projection on the tone arm base and adapted to be engaged by one arm of the said bell crank lever, the other arm of the bell crank lever being adapted to be engaged by the cam end of the said lever, actuating means controlled by the tone arm to swing the cam end of the cam lever upward and the other end downward at the time the stylus reaches the end of the sound groove, continually driven means adapted to engage the lowered end of the cam lever to impart a swinging motion to the same to swing the raised tone arm outward, and a fixed plate having a beveled end for the cam lever to ride up on and support it with the cam end in raised position.

6. A repeating mechanism for phonographs, comprising a normally inactive cam lever mounted to swing up and down and sidewise, a bell crank lever fulcrumed on the base of the tone arm, a projection on the tone arm base and adapted to be engaged by one arm of the said bell crank lever, the other arm of the bell crank lever being adapted to be engaged by the cam end of the said lever, a pair of electromagnets having an armature lever, a sliding pin engaged by the said armature lever and adapted to engage the cam end of the said cam lever at the time the electromagnets are energized and the armature lever is attracted, a continually driven arm adapted to engage the lowered end of the cam lever to impart a swinging motion to the same, and an electric switch mechanism for the said electromagnets and controlled by the tone arm to close the switch at the time the stylus reaches the end of the sound groove.

7. A repeating mechanism for phonographs, comprising a normally inactive cam

lever mounted to swing up and down and sidewise, a bell crank lever fulcrumed on the base of the tone arm, a projection on the tone arm base and adapted to be engaged by one arm of the said bell crank lever, the other arm of the bell crank lever being adapted to be engaged by the cam end of the said lever, a pair of electromagnets having an armature lever, a sliding pin engaged by the said armature lever and adapted to engage the cam end of the said cam lever at the time the electromagnets are energized and the armature lever is attracted, a continually driven arm adapted to engage the lowered end of the cam lever to impart a swinging motion to the same, an electric switch mechanism for the said electromagnets and controlled by the tone arm to close the switch at the time the stylus reaches the end of the sound groove, the said switch having a fixed contact member on the tone arm, and an adjustable contact member adapted to be engaged by the said contact member on the tone arm.

8. A repeating mechanism for phonographs, comprising a normally inactive cam lever mounted to swing up and down and sidewise, a bell crank lever fulcrumed on the base of the tone arm, a projection on the tone arm base and adapted to be engaged by one arm of the said bell crank lever, the other arm of the bell crank lever being adapted to be engaged by the cam end of the said lever, a pair of electromagnets having an armature lever, a sliding pin engaged by the said armature lever and adapted to engage the cam end of the said cam lever at the time the electromagnets are energized and the armature lever is attracted, a continually driven arm adapted to engage the lowered end of the cam lever to impart a swinging motion to the same, an electric switch mechanism for the said electromagnets and controlled by the tone arm to close the switch at the time the stylus reaches the end of the sound groove, the said switch having a fixed contact member on the tone arm and an adjustable contact member adapted to be engaged by the said contact member on the tone arm, and an adjustable stop adapted to be engaged by the said tone arm pin to limit the outward swinging motion of the tone arm.

9. A repeating mechanism for phonographs, comprising a normally inactive cam lever mounted to swing up and down and sidewise, a bell crank lever fulcrumed on the base of the tone arm, a projection on the tone arm base and adapted to be engaged by one arm of the said bell crank lever, the other arm of the bell crank lever being adapted to be engaged by the cam end of the said lever, the hub of the bell crank lever being eccentrically mounted on the

tone arm base, a fixed segmental plate for the said hub of the bell crank lever to rest on, actuating means controlled by the tone arm to swing the cam end of the cam lever upward and the other end downward at the time the stylus reaches the end of the sound groove, and continually driven means adapt-

ed to engage the lowered end of the cam lever to impart a swinging motion to the same to swing the raised tone arm.

WILLARD E. CLEVELAND.

Witnesses:

OCTAVE E. CHRÉTIEN,
R. C. BELDEN.

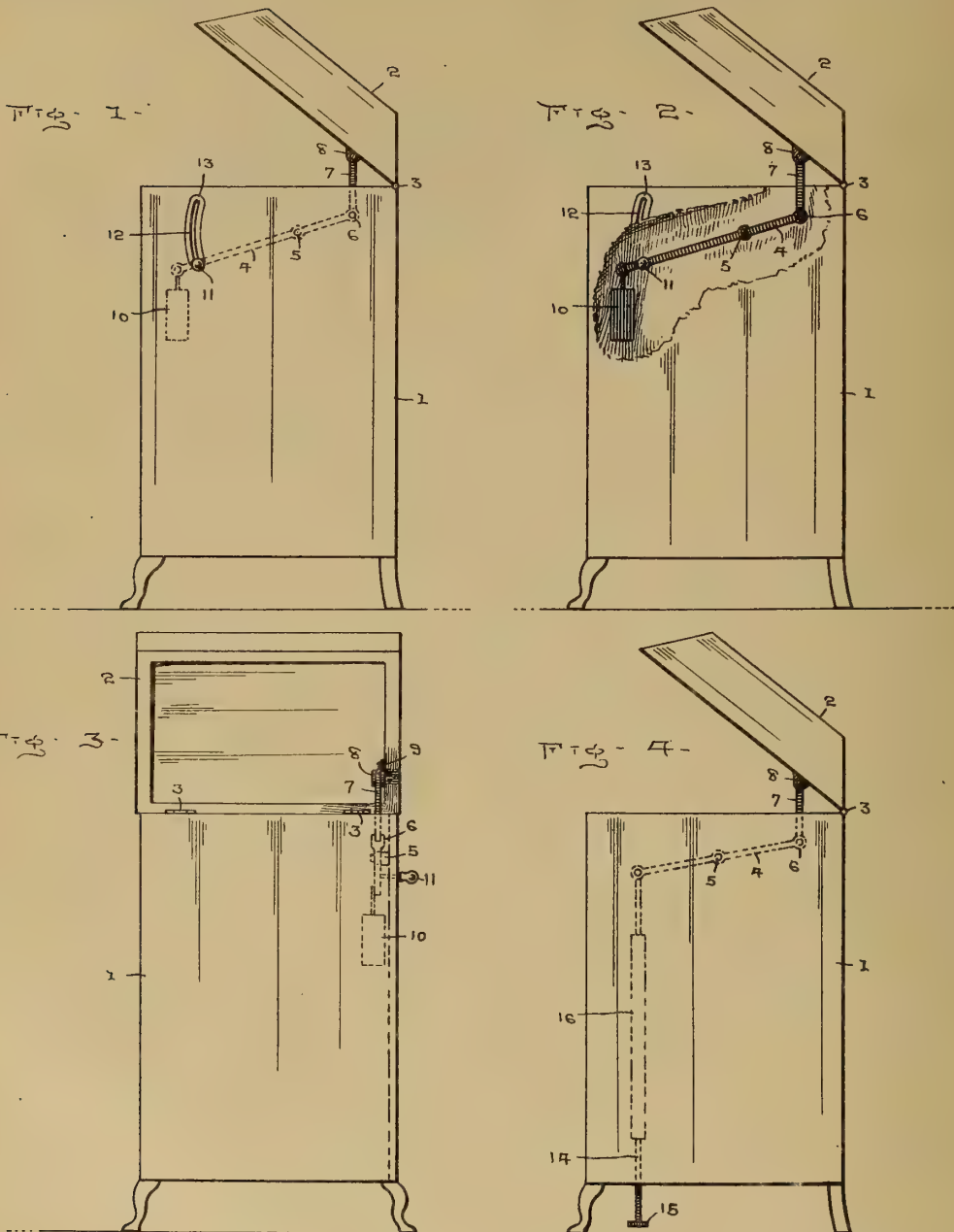
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

LID LIFTING DEVICE,
#1,223,387-----E. G. Hayne,
Patented-April 24th, 1917.
Filed-March 28th, 1916.

E. G. HAYNE.
LID LIFTING DEVICE.
APPLICATION FILED MAR. 28, 1916.

1,223,387.

Patented Apr. 24, 1917.



~~~~~ E. G. Hayne ~~~~~  
Inventor

By *W. J. FitzGerald* 46  
Attorney

# UNITED STATES PATENT OFFICE.

EDWARD G. HAYNE, OF OTTAWA, ILLINOIS.

## LID-LIFTING DEVICE.

1,223,387.

Specification of Letters Patent. Patented Apr. 24, 1917.

Application filed March 28, 1916. Serial No. 87,360.

*To all whom it may concern:*

Be it known that I, EDWARD C. HAYNE, a citizen of the United States, residing at Ottawa, in the county of La Salle and State of Illinois, have invented certain new and useful Improvements in Lid-Lifting Devices; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to new and useful improvements in lid lifting devices and more particularly to that class employed for lifting the lid or cover of a phonograph cabinet, and my object is to provide a pivoted beam, one end of which is attached to the lid or cover of the cabinet and the opposite end provided with a counter balance weight.

A further object is to so connect the weight and lid to the beam that the lid may be raised to any predetermined angle and be supported in its adjusted position by the weight.

A further object is to so equalize the weight of the lid with respect to the counter balance weight that the lid will not descend of its own volition.

And a further object is to provide means for operating the beam to raise and lower the lid.

Other objects and advantages will be hereinafter set forth and more particularly pointed out in the accompanying specification.

In the accompanying drawings which are made a part of this application,

Figure 1 is a side elevation of a phonograph cabinet showing the lid therefor in elevated position.

Fig. 2 is a similar view thereof showing the upper portion of the wall of the cabinet broken away.

Fig. 3 is a front elevation of the cabinet with the lid in elevated position, and

Fig. 4 is a side elevation of the cabinet showing a modified form of means for operating the beam.

Referring to the drawings in which similar reference numerals designate corresponding parts throughout the several views, 1 indicates a cabinet, which in this instance is shown as a phonograph cabinet, and 2 indicates the lid or cover for said cabinet, one edge of which is attached to the upper end of the cabinet by means of a hinge 3.

As it is necessary to elevate the lid when a new record is placed in position or removed from the phonograph, considerable difficulty is frequently encountered in raising and lowering the lid as said lid is of considerable weight and unless extreme care is used the lid may drop and break the record or mash the fingers of the one raising the lid, and likewise the jar incident to the lid striking the top of the cabinet frequently loosens the joints of the lid or cracks the coating or varnish thereon, thus spoiling the appearance of the cabinet, and to this end I provide means for elevating the lid without necessitating the engagement of the hands with the lid comprising a beam 4, which is pivotally attached to a stud 5 secured to the inner face of the cabinet 1.

One end of the beam 4 is preferably bifurcated to form ears 6 between which is pivotally secured one end of a strap 7, the opposite end of the strap being pivotally secured between ears 8 of a bracket 9, said bracket being attached to the lid 2 in any suitable manner adjacent the hinge edge of the lid. In order to equalize the weight of the lid whereby the same may be easily raised or lowered, a balance weight 10 is attached to the opposite end of the beam 4 from that engaged with the strap 7, the size of the weight 10 being such as to equal the weight of the lid against the beam, so that the weight at both ends of the beam will be uniform, and it will be readily seen that the lid may be raised or lowered with a minimum amount of exertion and that the lid will be held in its adjusted position until such time as the beam is operated to further raise or lower the same.

It will be understood of course that pressure may be directed against the lid to open or close the same but as the highly polished surface of the lid will become marred by finger prints remaining thereon, I prefer to employ a handle 11 for raising and lowering the lid, said handle projecting through a curved slot 12 in one wall of the cabinet, any suitable form of plate 13 being provided around said slot to protect the surface of the cabinet against wear thereon and also to provide a suitable trimming around the slot. Instead, however, of providing the handle 11 for raising and lowering the lid, an elongated rod 14 may be attached to the end of the beam 4 which projects downwardly through the bottom wall of the cabi-

net and has a head 15 which may be engaged with the foot for raising and lowering the lid, the rod 14 having an elongated counter weight 16 attached thereto which equalizes the weight of the lid.

While I have shown the counter balance device as applied to use in connection with the lid of a phonograph cabinet, I desire it to be clearly understood that the same may be used in connection with any device having a lid operated similar to the structure herein shown.

In operating the device it is but necessary to exert but a light upward or downward pressure upon the handle 11 in order to swing the lid to a closed or open position and the lid may be moved to any suitable angle and held in such position by the counter balance weight, and in view of the equalization of the weight of the lid at one end of the beam and the counter weight at the opposite end thereof, the lid will not move out of its adjusted position until pressure is employed for moving the same upwardly or downwardly.

It will likewise be seen that by providing either the handle 11 or rod 14 the lid may be raised or lowered without touching the cabinet with the fingers, thus eliminating the possibility of marring the varnish upon the cabinet or lid by finger marks, and as the lid gradually descends and pressure is applied to lower the same, the danger of in-

juring the lid by striking the top of the cabinet a blow is entirely eliminated.

It will likewise be seen that all of the parts except the operating handles are incased within the cabinet so that said parts will be excluded from view.

Having thus fully described my invention what I claim as new and desire to secure by Letters Patent of the United States, is:—

The combination with a cabinet having a hinged lid thereon, of a beam pivotally attached to the inner face of the cabinet, a strap pivoted at one end to one end of the beam and at its opposite end to the under face of the lid, a rod pivotally connected to the opposite end of the beam and projecting downwardly through the bottom of the cabinet, a counter balancing weight mounted upon said rod, and a head piece carried by the lower end of the rod whereby the lid may be opened or closed by the actuation of the head piece, said head piece adapted to engage with the surface upon which the cabinet is mounted to limit the opening movement of the lid.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWARD G. HAYNE.

Witnesses:

W. I. HARRIS,  
W. C. RIALE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



ACOUSTIC DEVICE,  
#1,223,545-----R. Whitman,  
Patented-April 24th, 1917.  
Filed-December 23rd, 1914.

R. WHITMAN.  
ACOUSTIC DEVICE.  
APPLICATION FILED DEC. 23, 1914.

1,223,545.

Patented Apr. 24, 1917.

Fig. 1.

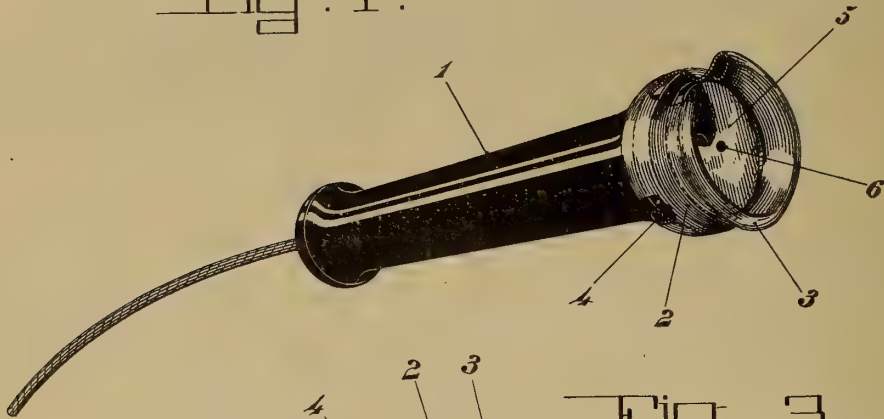


Fig. 2.

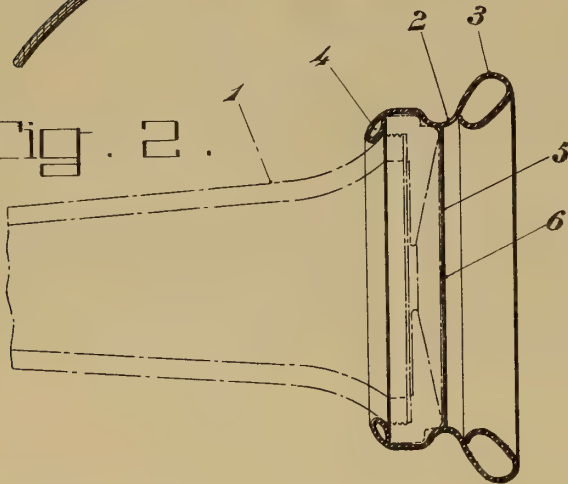


Fig. 3.

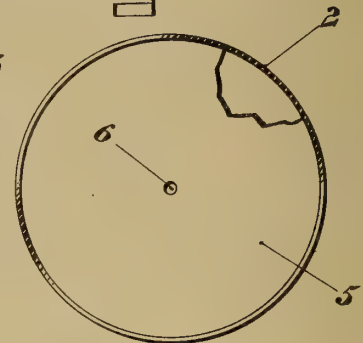


Fig. 6.

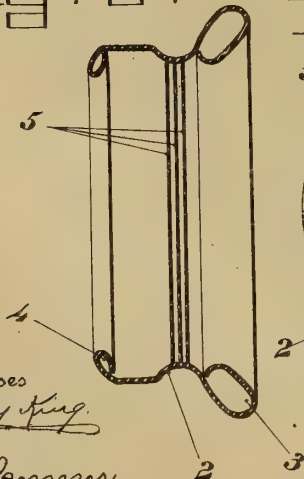
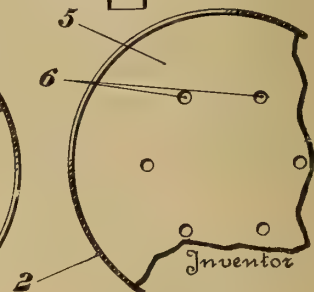
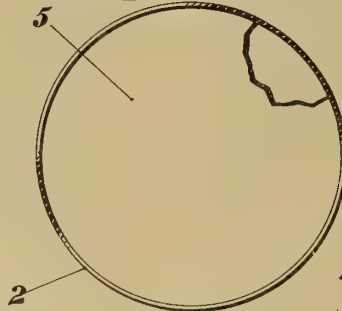


Fig. 4. Fig. 5.



Witnesses

*Larry King*

*C. M. Connor*

*By*

*Randolph Whitman*

*A. P. Connor*

*Attorney*

# UNITED STATES PATENT OFFICE.

RANDOLPH WHITMAN, OF MOUNT VERNON, NEW YORK.

## ACOUSTIC DEVICE.

1,223,545.

Specification of Letters Patent.

Patented Apr. 24, 1917.

Application filed December 23, 1914. Serial No. 878,688.

### *To all whom it may concern:*

Be it known that I, RANDOLPH WHITMAN, a citizen of the United States, residing at Mount Vernon, Oakwood Heights, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Acoustic Devices, of which the following is a specification, reference being had to the accompanying drawing.

This invention refers to acoustic devices, and more in particular to those used to modify, change or regulate the sound produced in artificial apparatus.

Some of the main objects of this invention are:—

To produce a device for removing metallic and other objectionable extraneous sounds from sound transmitting apparatus.

To provide means for modifying the tone of transmitted sound, to a desirable extent.

To provide means for bringing transmitted sounds directly to the ear mechanism of a hearer, and to the exclusion of extraneous sounds.

To provide means for filtering artificially transmitted sounds so that they will appear to the hearer in their normal values.

To provide means for eliminating or absorbing high tones, and nerve straining sounds before the ear is reached.

To provide means for making the conversation over telephone lines and the like, more distinct and agreeable.

Other objects will become apparent as the invention is more fully set forth.

Many devices have been used to eliminate the difficulties or objections met with in transmitted sound practice and this has been particularly noticeable in connection with telephone receivers. Rubber caps have been used, over the diaphragm end of receivers, but in every case they have impeded the action of the sound waves arising from the receivers, so as to make their use objectionable. In apparently every case, efforts have been directed to keep out extraneous sounds, rather than improve or change the sound in question itself. This invention is directed toward the sound as it comes from the receiver or other apparatus, and taking the sound it converts it mainly by means of a cushion, into tones more suitable to the hearer or the purpose.

In the drawings, which show by way of example, an embodiment of this example:

Figure 1 is a view in perspective showing the device embodying this invention, applied to a telephone receiver.

Fig. 2 is a sectional view of the device. 60

Fig. 3 is a plan view of the device.

Fig. 4 shows a modification of the diaphragm which is not perforated.

Fig. 5 shows a modification with a plurality of holes in its diaphragm. 65

Fig. 6 shows a modification of the device with a plurality of diaphragms.

Similar reference characters refer to similar parts throughout the drawings.

In the construction shown in the drawings, the reference character 1 represents a telephone receiver and on which is mounted a device 2, which consists of a ring like body having both ends 3 and 4 turned inwardly.

The body swells out at the end 3 so as to give a quasi-megaphone shape, and the other end 4 is arranged to closely embrace the telephone receiver under its cap. The body is preferably constructed of stiff yet substantially flexible material such as rubber of semi-hardness. 75

A diaphragm 5 of very flexible and elastic material (such as gum elastic, or that which play balloons are constructed of) is secured inside of the body in a suitable manner, and may be made integral therewith if desired. It is not desired, however, to limit the diaphragm or body of the device construction to any particular material. 85

The diaphragm is so placed is the body that it will preferably close the end of the receiver adjacent to the diaphragm of the latter so the sound waves from the same will efficiently act upon the diaphragm 5 in the device. It is also preferred to have the diaphragm 5 perforated, as shown at 6. In perforating the diaphragm it is preferable to avoid locations in the same, where the effective elasticity of the diaphragm might be affected or where the maximum waves effect is found or known to take place from. 90 95 100

The diaphragm 5 is of course made taut in the body. The amount of the perforating can be arranged to suit the circumstances as well as the number of the diaphragms. For ordinary usage on a telephone receiver it is preferable to use only one diaphragm with a slight perforation. 105

In operation, the sound waves from the apparatus, in this case the diaphragm of the receiver, impinge upon the diaphragm 5 of the device, and the air being contained and 110



elastic, a cushion and filter is provided for the sound. The diaphragm 5 then conveys the sound, but with a less amplitude thereby lowering the tone of the sound and improving its timbre. The sound at last acts upon the ear which is held against the end 3, and surges back and forth from the device diaphragm, acting in quasi-unison therewith and practically directly from the diaphragm. The form of the end 3 serves to exclude extraneous sounds, and its material, being relatively flexible, offers no shock to the ear.

While but one general form and use of this invention is shown in the drawings, it is not desired to limit this application for patent to the same, or in any other way otherwise than limited by the prior art, as many forms of construction of this invention may be made without departing from the principles thereof, and coming within the scope of the appended claims.

Having thus described the invention, what is claimed is:

1. In combination with a sound giving device, a very flexible perforated diaphragm, and flexible means adapted to connect the diaphragm with the device and adjacent to its sound giving part, and means for delivering sound waves directly to the ear of a user, when said diaphragm is acted upon by the sound waves from said device.

2. In combination with a sound giving device, very flexible perforated diaphragm means, means for flexibly connecting the diaphragm means to the device and adjacent to the sound giving part, and means provided for permitting sound waves to pass directly through the diaphragm means.

3. In combination with a sound device, an attachment comprising a holder adapted to embrace a portion of the sound device, a perforated diaphragm transversely disposed in the holder, and having a perforation therein for indicating the proper tension of the diaphragm and the position of the holder on the device.

4. In combination with a telephone re-

ceiver, an attachment comprising a soft rubber holder adapted to embrace the receiver, an elastic diaphragm stretched across the holder, said diaphragm being provided with a relatively small central hole therein, said diaphragm being arranged to lower and soften the tone of sounds coming from the receiver without apparently reducing their force.

5. In combination with a telephone receiver, an attachment comprising an inclosed holder adapted to cup over the receiver, a centrally disposed elastic diaphragm means in the holder arranged between the receiver shell and the outer opening of the holder whereby a cushion of air will be provided on both sides of the diaphragm and the diaphragm will also act as a cushion so that the sounds from the receiver will be modified.

6. An attachment for telephone receivers comprising in combination, a soft rubber receiver-inclosing member having rolled inclosing edge portions and its outer portion inwardly bell-mouthed, a relatively small elastic diaphragm integrally connected to the bell-mouthed portion of the said member and centrally arranged with respect to the member, and a perforation centrally arranged in the diaphragm, said perforation being so flexibly held by the member that the stress put thereon will cause such variation in the form of the perforation as to indicate the action of the attachment on the sound waves acting and passing there-through.

7. An elastic ear piece having a diaphragm permanently secured thereto adapted to be stretched over the ear piece of a telephone receiver and a quasi-megaphone projection for engaging the head of the user.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

RANDOLPH WHITMAN.

Witnesses:

E. W. DAVIDSON,

STUART R. WHITMAN.

TALKING MACHINE,

#1,223,889-----T. Kraemer,

Patented-April 24th, 1917.

Filed-March 3rd, 1915.

T. KRAEMER.  
TALKING MACHINE.  
APPLICATION FILED MAR. 3, 1915.

1,223,889.

Patented Apr. 24, 1917.

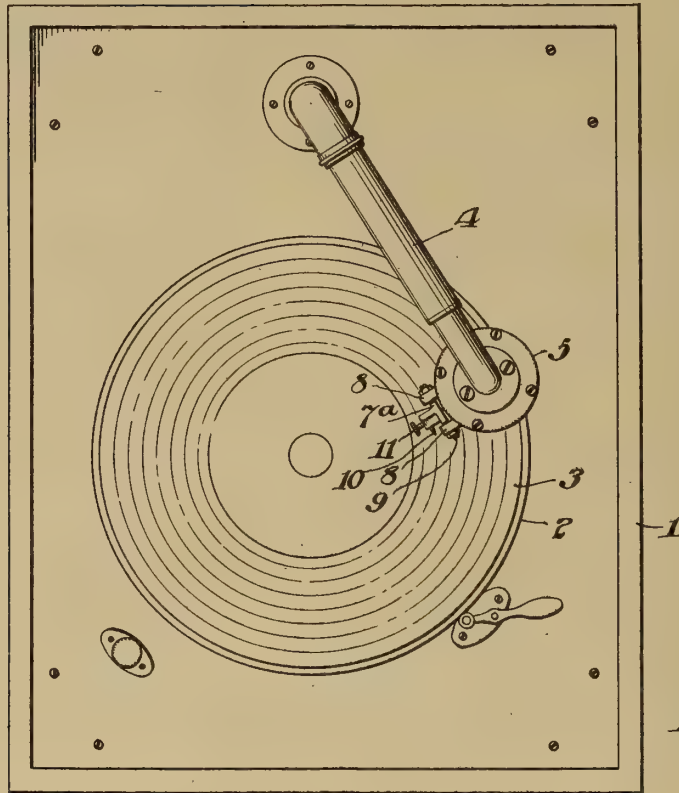


Fig. 1.

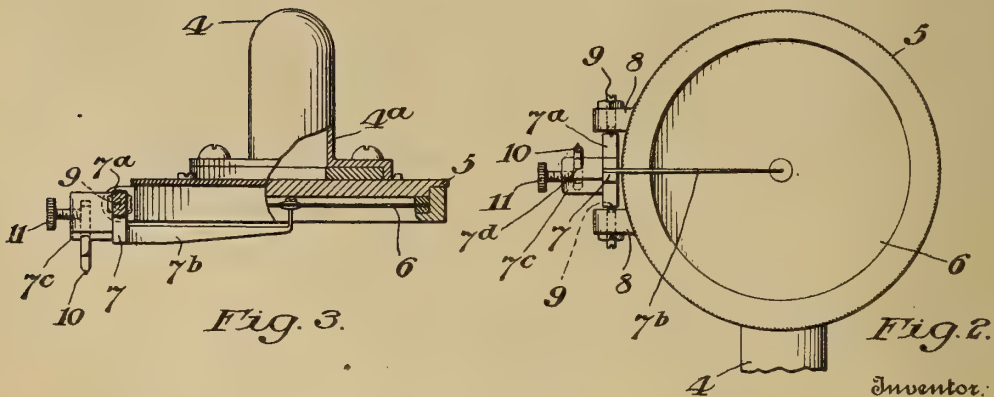


Fig. 3.

Fig. 2.

Inventor:

Thomas Kraemer,

Witnesses:

R. Schleicher.  
J. S. Denny

By Charles N. Butler

Attorney



# UNITED STATES PATENT OFFICE.

THOMAS KRAEMER, OF PHILADELPHIA, PENNSYLVANIA.

## TALKING-MACHINE.

1,223,889.

Specification of Letters Patent. Patented Apr. 24, 1917.

Application filed March 3, 1915. Serial No. 11,662.

### *To all whom it may concern:*

Be it known that I, THOMAS KRAEMER, a citizen of the United States, residing in the city of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented certain Improvements in Talking-Machines, of which the following is a specification.

My invention relates more particularly to sound boxes for talking machines and my leading object is to provide such sound boxes with improved universal means operable without change with laterally or vertically undulating records.

In the accompanying drawings, Figure 1 is a plan view of a talking machine embodying my improvements; Fig. 2 is a bottom plan view of the sound box shown in top plan view in Fig. 1; and Fig. 3 is a broken side elevation of the construction shown in Fig. 2.

The mechanism, in the form illustrated in the drawings, comprises the case 1, the turn table 2 revolubly mounted thereon and the record disk 3 mounted on the turn table, in combination with the tone arm 4 provided with the sound box 5 having the diaphragm 6 disposed transversely to the tone arm section 4<sup>a</sup> and approximately parallel to the disk 3.

A lever 7, disposed transversely to the record or grooves beneath it, is fulcrumed through the peripheral bearings 8 (on the sound box) which are provided with the adjustable pivots or arbors 9 for engaging the bearings 7<sup>a</sup> of the lever, whereby the latter is adapted to oscillate substantially at right angles to the diaphragm, which is oscillated by the lever's arm 7<sup>b</sup> connected therewith at or near the center thereof. The arm 7<sup>b</sup> is oscillated by the lever's oppositely extending arm 7<sup>c</sup>, which is provided with a socket 7<sup>d</sup> for receiving a needle or stylus 10 and with a set screw 11 for holding the needle in the socket, the needle being offset from the axis of the lever to which, as also to the diaphragm, it is transversely disposed.

In this construction, the action upon the needle, induced by a vertically undulating groove or by a laterally undulating groove is transverse and eccentric to the axis of oscillation of the lever, which is therefore oscillated by either action to effect the vibration of the diaphragm 6.

While in the form of construction here adopted for illustrating the invention, the

axis of the lever lies in a plane offset from and substantially parallel to the plane passing through the center of the diaphragm and the axis of oscillation of the tone arm and the needle is inclined to the vertical, it will be understood that these, as well as other features of the construction, may be modified within the scope of the invention, which comprehends generic means for translating forces imposed upon a needle or stylus, whether by laterally or vertically undulating records or grooves, so that such forces will have a component or components acting transversely to and upon the diaphragm to effect the normal vibration thereof. The construction shown has the advantage, however, of effecting not only the specified primary object of the invention, but provides for a recognized advantageous disposition of the diaphragm with reference to the record and the tone arm.

The expression "universal mechanism" as used in the claims is intended to mean a mechanism that will translate without necessity for adjustment the transverse actions of or forces induced by vertically and laterally formed records or record grooves upon needles and impose a normal or substantially vertical force upon the sound box diaphragm.

Having described my invention, I claim:

1. In a talking machine, a sound box having a diaphragm, a lever fulcrumed intermediate its length on said sound box, and a stylus connected to the outer arm of said lever, offset from the axis thereof and disposed transversely to said axis, in combination with a tone arm to which said sound box is immovably connected, so that lateral or vertical undulations of records revolving in engagement with said stylus will rock said lever.

2. In a talking machine, a sound box having a diaphragm, a lever having a fulcrum on said sound box, said lever having one arm fixed to said diaphragm and a transverse socket carried by the other, a stylus disposed in said socket transversely to said lever, and a tone arm to which said sound box is connected so that laterally and vertically undulated records will act on said stylus and vibrate said diaphragm normally, said lever extending transversely to said tone arm.

3. In a talking machine, a sound box having a diaphragm, a lever fulcrumed inter-

mediate its length on a side of said sound box, said lever having an arm connected with said diaphragm and an oppositely extending arm provided with a stylus offset from and disposed transversely to the axis of said lever and adapted to coact with a record, and a tone arm to which said sound box is immovably connected so that lateral or vertical undulations of a record coacting with said stylus will rock said lever.

4. In a talking machine, an oscillatory tone arm, a sound box connected to said tone arm, a lever having an axis of oscillation on a side of said sound box, said axis extending transversely to the length of said lever, said lever having one arm connected with said diaphragm and another arm extending beyond said sound box, and a stylus connected with the arm of said lever beyond said sound box, said sound box being movable in a circular arc by the oscillation of said tone arm, and the axis of said lever being movable through positions substantially parallel to radii of said arc.

5. In a talking machine, an oscillatory tone arm, a sound box fixed to said tone arm with the face of its diaphragm disposed substantially parallel to the face of a record adapted for use therewith, a lever fulcrumed intermediate its length on said sound box with an arm thereof connected with said diaphragm, said lever having an axis of oscillation extending in approximately the same direction as the tangent to the record groove at the point thereof engaged by the stylus, and said stylus connected with an arm of said lever disposed oppositely to said arm first named.

6. In a talking machine, an oscillatory tone arm, a sound box fixed to said tone arm with its diaphragm disposed in a substantially horizontal plane, a lever having a fulcrum on said sound box offset laterally from said tone arm, said lever oscillating on said fulcrum about an axis extending substantially parallel to said tone arm, and a stylus fixed to said lever transversely thereto.

7. In a talking machine, an oscillatory tone arm, a sound box fixed to said tone arm with the face of its diaphragm disposed substantially parallel to the face of a record adapted for use therewith, a lever having a fulcrum on said sound box offset laterally

from said tone arm with an axis of oscillation approximately parallel to a tangent to the record groove at the point of contact of the stylus therewith, and a stylus fixed to an arm of said lever and extending transversely thereto, whereby transverse forces applied to said stylus oscillate said lever and vibrate said diaphragm normally.

8. In a talking machine, a sound box having a diaphragm, a lever fulcrumed intermediate its length on said sound box, and a stylus connected to the outer arm of said lever, offset from the axis thereof and disposed transversely to said axis, in combination with a member to which said sound box is immovably connected, so that lateral or vertical undulations of records revolving in engagement with said stylus will rock said lever.

9. In a talking machine, a sound box having a diaphragm, a lever fulcrumed intermediate its length on a side of said sound box, said lever having an arm connected with said diaphragm and an oppositely extending arm provided with a stylus offset from and disposed transversely to the axis of said lever and adapted to coact with a record, and a member to which said sound box is immovably connected so that lateral or vertical undulations of a record coacting with said stylus will rock said lever.

10. In a talking machine, an oscillatory member, a sound box connected to said member, a lever having an axis of oscillation on a side of said sound box, said axis extending transversely to the length of said lever, said lever having one arm connected with said diaphragm and another arm extending beyond said sound box, and a stylus connected with the arm of said lever beyond said sound box, said sound box being movable in a circular arc by the oscillation of said member, and the axis of said lever being movable through positions substantially parallel to radii of said arc.

In testimony whereof I have hereunto set my name this 27th day of February, 1915, in the presence of the subscribing witnesses.

THOMAS KRAEMER.

Witnesses:

Jos. G. DENNY, Jr.,  
C. N. BUTLER.

UNIVERSAL TONE ARM,  
#1,223,927-----P. Becker,  
Patented-April 24th, 1917.  
Filed-January 23rd, 1917.



P. BECKER.  
UNIVERSAL TONE ARM.  
APPLICATION FILED JAN. 23, 1917.

1,223,927.

Patented Apr. 24, 1917.

Fig. 1.

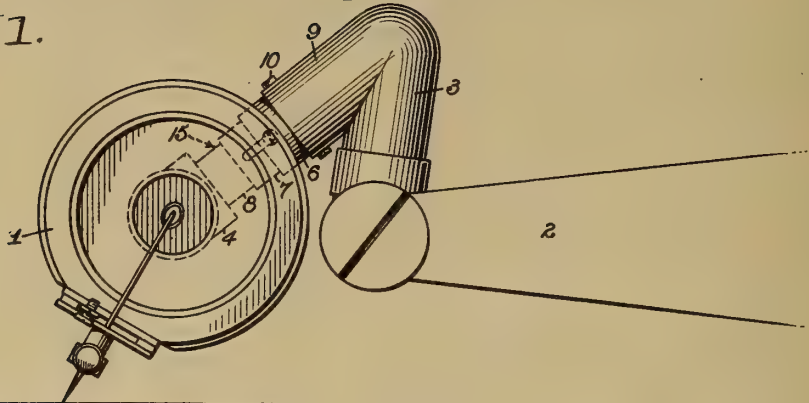


Fig. 2.

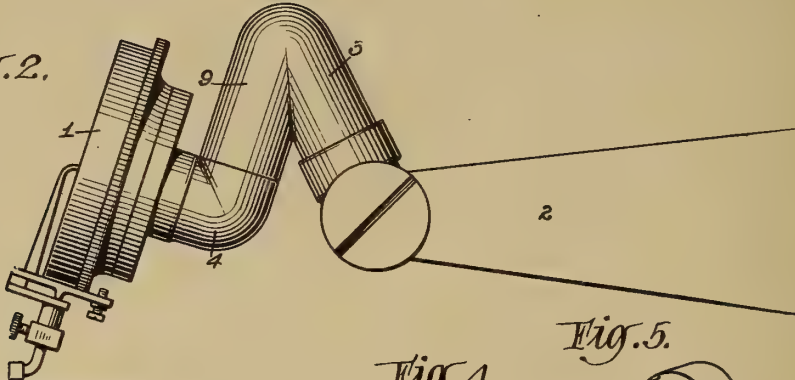


Fig. 4.

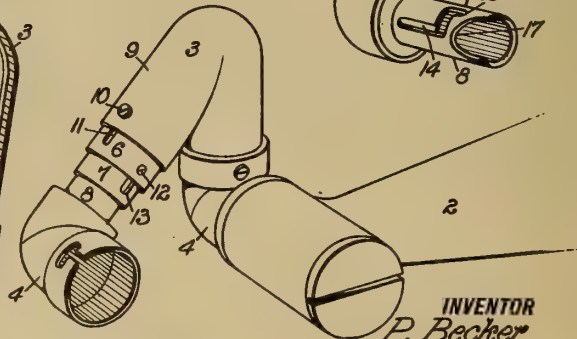


Fig. 5.

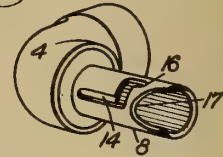
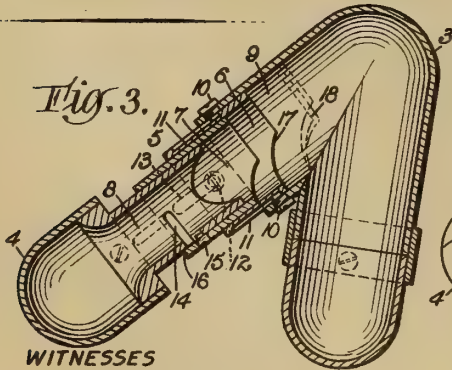


Fig. 3.



WITNESSES  
Frederick Nihl.  
63 Broadway

INVENTOR  
P. Becker  
BY *M. C.*  
ATTORNEYS

# UNITED STATES PATENT OFFICE.

PETER BECKER, OF NEW YORK, N. Y.

UNIVERSAL TONE-ARM.

1,223,927.

Specification of Letters Patent. Patented Apr. 24, 1917.

Application filed January 23, 1917. Serial No. 143,939.

## *To all whom it may concern:*

Be it known that I, PETER BECKER, a subject of the German Emperor, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Universal Tone-Arm, of which the following is a full, clear, and exact description.

This invention relates to phonograph tone arms of that type which adjustably supports the reproducer so that the phonograph can play hill-and-dale and lateral cut records.

The invention has for its general objects to improve the construction and operation of devices of this character so that the needle will travel approximately in the same line on either type of record, whereby a better reproduction of sounds will be obtained and there will be less wear and tear on the sound grooves.

A more specific object of the invention is the provision of a novel form of joint between the gooseneck of the tone arm and the reproducer, whereby the latter can be easily and quickly adjusted to its different positions.

With such objects in view, and others which will appear as the description proceeds, the invention comprises various novel features of construction and arrangement of parts which will be set forth with particularity in the following description and claims appended hereto.

In the accompanying drawing, which illustrates one embodiment of the invention and wherein similar characters of reference indicate corresponding parts in all the views,

Figure 1 is a side view of a tone arm with the reproducer adjusted for playing lateral cut records;

Fig. 2 is a similar view showing the reproducer adjusted for playing hill-and-dale cut records;

Fig. 3 is an enlarged sectional view of the goose-neck and joint between the same and reproducer;

Fig. 4 is a perspective view with the reproducer detached; and

Fig. 5 is a perspective view of the reproducer-carrying elbow and the section of the joint attached thereto.

Referring to the drawing, 1 designates a reproducer, 2 a tone arm, 3 the gooseneck, 4 the elbow carrying the reproducer, and 5 the slip joint between the gooseneck and reproducer-carrying elbow.

The joint 5 is made up of a plurality of sleeve sections 6, 7 and 8 of successively smaller diameter to telescopically fit one within the other. The largest sleeve 6 slides in the straight outer member 9 of the gooseneck 3, and it is confined to a longitudinal movement by means of pins 10 engaging in longitudinal slots 11 in the outer surface of the section 6, said pins being threaded in the wall of the member 9 of the gooseneck. The section 7 is confined to a longitudinal movement by means of a screw pin 12 threaded in the wall of the section 6 and engaging in a longitudinal slot 13 in the section 7. The innermost section 8, which is rigidly fastened to the elbow 4, has a combined longitudinal and rotary motion. For this purpose the section 8 has an L-shaped slot 14 into which engages a screw pin 15 threaded in the section 7. One extremity of the slot 14 has a recess or offset 16, whereby a longitudinal pull after the reproducer has been turned, will lock the reproducer in the position shown in Fig. 1, so that the diaphragm of the reproducer will be parallel with the axis of the tone arm 2. When the joint 5 is contracted, as shown in Fig. 2, the reproducer is prevented from turning around the member 9 as an axis, because all the stop pins 10, 12 and 15 will prevent this. The joint 5 enables the outer member of the gooseneck to be lengthened or shortened so that the needle in the reproducer will be approximately in the same position on the record when playing hill-and-dale or lateral cut records. In order to prevent the telescoping sections of the joint 5 from choking the gooseneck, the inner ends of the sections 6, 7 and 8 have recesses 17 cut therein, which recesses all register when the joint 5 is contracted, as indicated by the dotted line 18, Fig. 3.

From the foregoing description taken in connection with the accompanying drawing, the advantages of the construction and method of operation will be readily understood by those skilled in the art to which the invention appertains, and while I have described the principle of operation, together with the device which I now consider to be the best embodiment thereof, I desire to have it understood that the device shown is merely illustrative and that such changes may be made when desired as fall within the scope of the appended claims.

Having thus described my invention, I



claim as new and desire to secure by Letters Patent:

1. A universal tone arm comprising a gooseneck, a reproducer-carrying elbow, and a telescoping joint between the elbow and gooseneck, said joint comprising three longitudinally slidable sections fitting one within another, the outermost section being slidable in the gooseneck and the innermost section being rigidly connected with the elbow, means for limiting the outer and intermediate section to a longitudinal movement, and means for limiting the inner section to a longitudinal and rotary movement.
2. A universal tone arm comprising a gooseneck, a reproducer-carrying elbow, and a telescoping joint between the elbow and gooseneck, said joint comprising three longitudinally slidable sections fitting one within another, the outermost section being slidable in the gooseneck and the innermost section being rigidly connected with the elbow, means for limiting the outer and intermediate section to a longitudinal movement,

and means for limiting the inner section to a longitudinal and rotary movement, the inner ends of the said sections being provided with recesses adapted to register when the said joint is contracted.

3. A universal tone arm including a gooseneck, a reproducer-carrying elbow, and an extensible joint between the elbow and gooseneck, said joint consisting of a plurality of tubular sections fitting one within another, the outermost section being slidable in the gooseneck, and the innermost being rigidly connected with the elbow, means for limiting all of the sections except the innermost one to a longitudinal movement and for limiting the extent of the longitudinal movement, and means between the innermost section and the next for permitting the innermost section to move longitudinally and rotatably and again longitudinally.

PETER BECKER.

Witness:

J. WALTER HENNING.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

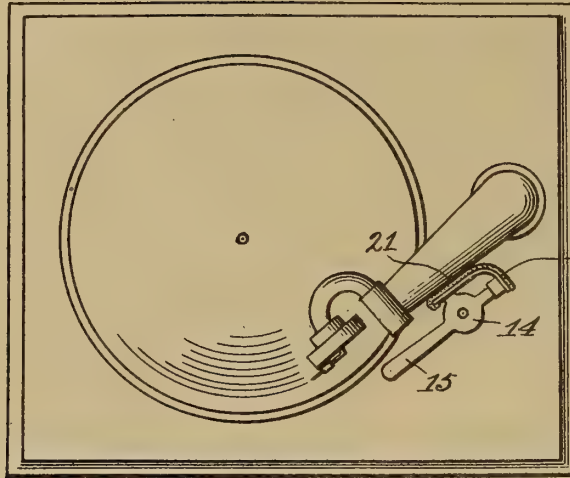


GRAPHOPHONE TONE ARM STOP,  
#1,223,970-----J.R.Hare,  
Patented-April 24th, 1917.  
Filed-November 13th, 1916.

J. R. HARE.  
 GRAPHOPHONE TONE ARM STOP.  
 APPLICATION FILED NOV. 13, 1916.

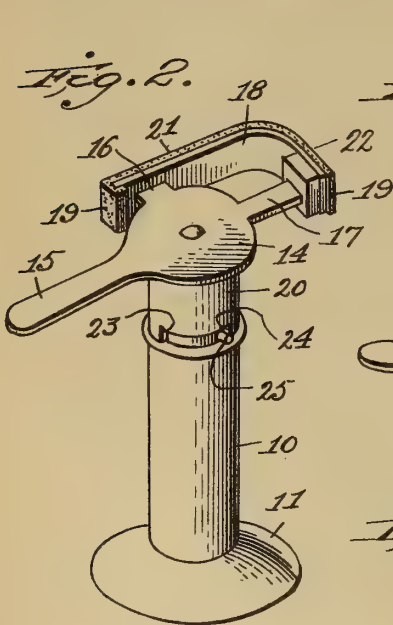
1,223,970.

Patented Apr. 24, 1917.

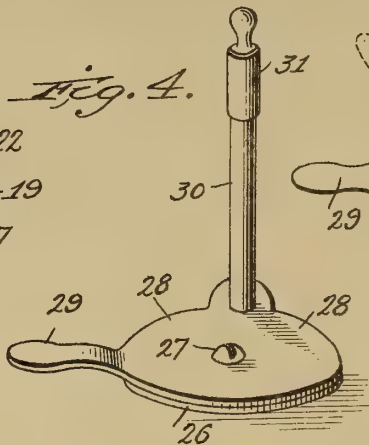


*Fig. 1.*

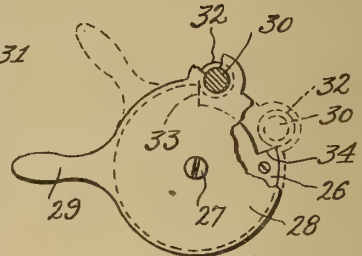
*Fig. 5.*



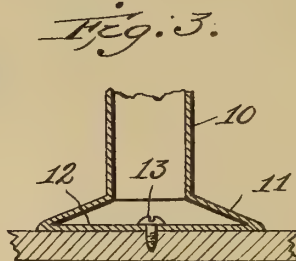
*Fig. 2.*



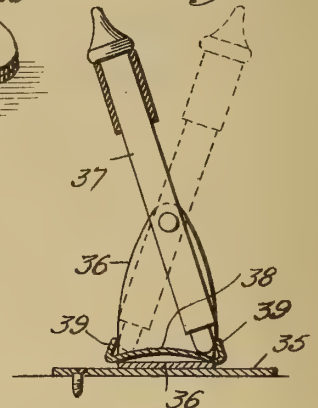
*Fig. 4.*



*Fig. 6.*



*Fig. 3.*



Witness  
*Edwin L. Jewell*

334

Inventor  
*John R. Hare,*  
 by *W. W. Thomas*  
 Attorneys

# UNITED STATES PATENT OFFICE.

JOHN R. HARE, OF NEW WINDSOR, MARYLAND.

## GRAPHOPHONE-TONE-ARM STOP.

1,223,970.

Specification of Letters Patent. Patented Apr. 24, 1917.

Application filed November 13, 1916. Serial No. 131,107.

*To all whom it may concern:*

Be it known that I, JOHN R. HARE, a subject of the King of Great Britain, residing at New Windsor, in the county of Carroll and State of Maryland, have invented new and useful Improvements in Graphophone-Tone-Arm Stops, of which the following is a specification.

This invention relates to improvements in graphophone tone arm stops, and has for its object to provide an adjustable means which will limit the movement of the tone-arm in one direction to adjust the stylus in its correct starting position upon records of different diameters.

Ordinarily the tone-arm is moved toward the edge of the record and with the utmost care and patience the stylus is placed in its starting position. This at times is very difficult, owing to poor light upon the record or to the faulty eyesight of the operator. With the improved stop, the tone-arm is swung outwardly until it strikes the stop and is lowered upon the record when it will be placed correctly to start playing.

The object of this invention is attained by the means illustrated in the accompanying drawing, in which,—

Figure 1 is a plan view showing the top of a graphophone with its tone-arm in engagement with one form of the improved stop. Fig. 2 is a perspective view of the improved stop shown in Fig. 1. Fig. 3 is a vertical sectional view through the lower end of the standard of the stop shown in Figs. 1 and 2. Fig. 4 is a perspective view of a modified form of the stop. Fig. 5 is a plan view of the same showing the stopping post in section and a portion of the rotating plate broken away to show underlying parts. Fig. 6 is a side elevation of a further modification, parts being shown in section.

Similar reference numerals in all of the figures of the drawing designate like parts.

The form of stop shown in Figs. 1, 2 and 3 embodies a standard 10 which is preferably tubular and has a base 11 provided with a bottom plate 12, shown in Fig. 3, by which it is secured to the top of the graphophone case by a central screw 13. Rotatably mounted upon the top end of the tubular standard 10 is the adjustable stop, the same comprising a supporting plate 14

furnished with a handle 15 at one side and radially extending arms 16 and 17 projecting from two of its other sides. The arm 16 is somewhat shorter than the arm 17, and secured to these arms is a vertically disposed plate 18 upon the outer face of which is secured a pad 19 to form a buffer for the tone-arm. The supporting plate 14 has riveted to its under side a depending tubular portion 20 which snugly engages over the top end of the tubular standard 10 and upon which it is adapted to rotate. The buffer, which includes the pad 19 and the plate 18, is shaped to form substantially flat faces 21 and 22, arranged at right angles to each other, one of which is located nearer the central pivoted point than the other, so that when the face 21 is presented to abutting position the tone-arm will be stopped to locate the stylus correctly upon a record 12 inches in diameter, and when the face 22 is presented it will form an abutment to locate the stylus in the proper position upon a record 10 inches in diameter.

To positively limit the movement of the abutting faces when they reach their abutting positions, a limit stop is provided, the same being formed by recessing the lower edge of the depending portion 20 to form two shoulders 23 and 24 against which a pin or stud 25 engages. Thus, as shown in Fig. 2, when the pin 25 is in engagement with the shoulder 24, the buffer face 21 is presented to engage the tone-arm, and when the plate 14 is rotated to the right, the shoulder 23 is brought into engagement with the pin 25, and the buffer face 22 is positioned to stop the tone-arm.

The form of stop shown in Figs. 4 and 5 embodies a base plate 26 secured to the casing in any suitable manner and upon which is rotatably secured, by a central screw 27, a supporting plate 28 having a handle 29 extending from one side thereof. Mounted upon said supporting plate 28 at one side thereof and adapted to be carried therewith, is a vertically disposed stop-standard 30 having at its upper end a buffer sleeve 31. The lower end of said stop-standard 30 projects slightly below the lower face of the plate 28 and is preferably provided with a ring 32 which is adapted to contact with the shoulders 33 and 34 formed on the base



plate 26. This construction forms a limit stop for the adjustable stop-standard in two positions, to adapt the device for use in positioning the stylus upon either a 10 inch or a 12 inch record.

5 The form of stop shown in Fig. 6 embodies a base-plate 35 which is adapted to be secured to the top of the graphophone casing, said plate having secured thereon a bracket member 36 in the upper end of which is pivoted a stop-standard 37. The pivoted point of the standard 37 is intermediate of its ends, furnishing an upper buffer end and a lower limit-stop and which  
10  
15  
20  
25  
30  
coöperates with a spring plate 38 having a raised center portion and upwardly bent ends 39. It is evident that as the stop-standard is moved from one position to another, as indicated in dotted lines, the lower end of the standard will depress the raised spring portion and snap against the upturned end 39 on the opposite side, thus effectually forming a limit stop for the two positions of the standard.

From the above description it will be seen that each of the several forms embodies a stop which positively limits the movement of the buffer faces in both directions, and without the use of spring-held pawls or adjusting and locking screws. The several forms are simple in construction and in-

expensive, and are easily attachable to modern graphophones.

Having thus fully described my invention, I claim:—

1. A tone-arm stop, comprising a stationary base-plate, a supporting-plate rotatably secured to said base-plate, a vertically disposed stop standard mounted at one side of said supporting-plate to be carried therewith, and a limit-stop formed in said base plate which is adapted to be engaged by the lower end of said stop-standard.

2. A tone-arm stop, comprising a stationary base-plate having a recess in its edge to provide a pair of abutting shoulders, a supporting-plate rotatably mounted on said base-plate, and a vertically disposed stop-standard mounted at the edge of said supporting-plate, the lower end of said stop-standard being extended below said supporting-plate and adapted to travel in the recess of the base-plate and alternately engage said abutting shoulders to positively limit the movement of the stop-standard in both directions.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN R. HARE.

Witnesses:

J. EARLE ANDERS,  
J. F. LAMBERT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

CENTRIFUGAL BRAKE FOR  
REPRODUCING MECHANISMS,

#1,224,091-----H. A. Myers,  
Patented-April 24th, 1917.  
Filed-March 11th, 1915.

H. A. MYERS.  
CENTRIFUGAL BRAKE FOR REPRODUCING MECHANISMS.  
APPLICATION FILED MAR. 11, 1915.

1,224,091.

Patented Apr. 24, 1917.

FIG. 1

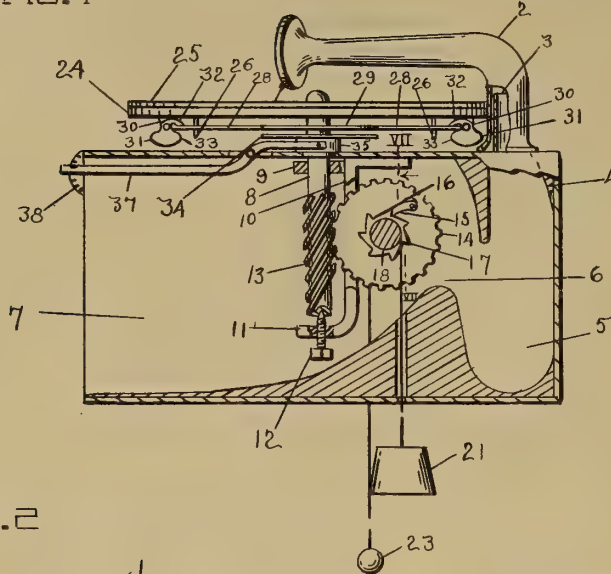
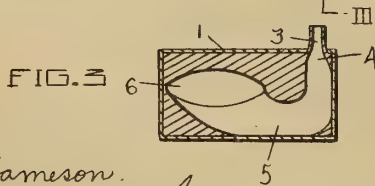
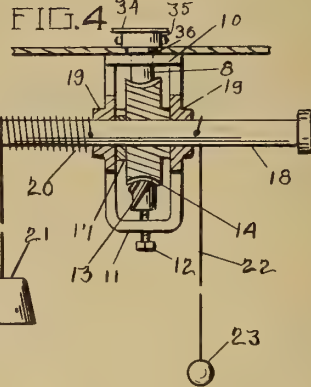
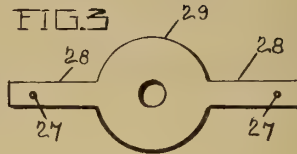
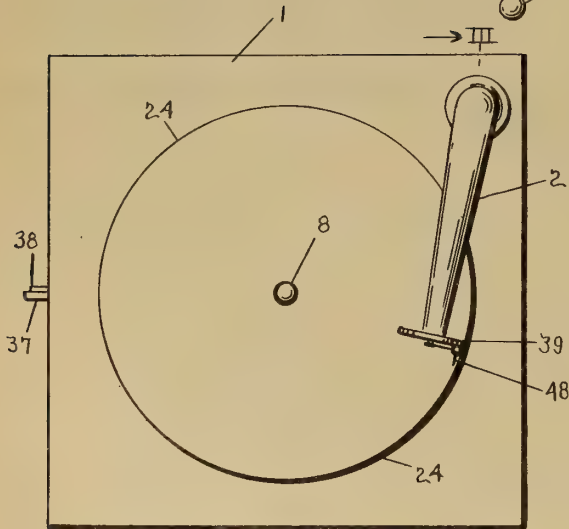


FIG. 2



Witnesses  
Gladys Jameson.  
C. H. Rauch

Hubert A. Myers

By

*[Signature]*

Inventor

Attorney



# UNITED STATES PATENT OFFICE.

HUBERT A. MYERS, OF TOLEDO, OHIO.

CENTRIFUGAL BRAKE FOR REPRODUCING MECHANISMS.

1,224,091.

Specification of Letters Patent.

Patented Apr. 24, 1917.

Application filed March 11, 1915. Serial No. 13,611.

*To all whom it may concern:*

Be it known that I, HUBERT A. MYERS, a citizen of the United States of America, residing at Toledo, Lucas county, Ohio, have invented new and useful Centrifugal Brakes for Reproducing Mechanisms, of which the following is a specification.

This invention relates to sound reproducing mechanisms.

This invention has utility when incorporated in talking machines or music boxes in connection with recording and reproducing.

Referring to the drawings:

Figure 1 is a side elevation, with parts broken away, of an embodiment of the invention in a disk record recording or reproducing machine;

Fig. 2 is a plan view of the machine of Fig. 1;

Fig. 3 is a plan view of the rotatable brake disk element; and

Fig. 4 is a fragmentary section on the line VII—VII, Fig. 1.

Mounted upon the support or box 1 and free to swing relatively thereto is the hollow arm 2, fitting a little freely on the upstanding sleeve 3 so that the arm 2 may rock slightly toward and from the box 1. From this sleeve 3 extends the amplifier passage or sound way of gradually increasing cross-section, comprising the downwardly extending duct section 4 merging into the laterally extending portion 5, which connects with the rising portion 6 expanding into the terminal section 7.

Mounted centrally in the box 1 is the shaft 8 having the lateral bearing 9 provided by the bracket 10, which has the downwardly extending arm 11 providing a mounting for the adjustable foot bearing screw 12, sustaining the shaft 8.

The shaft 8 has the worm 13 engaged by the worm wheel 14 having thereon the pawl 15 pressed by the spring 16 to engage the ratchet wheel 17 fast on the shaft 18, while the worm wheel 14 is loose thereon. The bracket 10 provides the pair of bearings 19 for the shaft 18.

Wound in one direction about the shaft 18 is the flexible element or line 20 extending to the suspended weight 21, while oppositely wound about this shaft 18 is a second flexible element or line 22 extending to a lesser weight 23. There is accordingly pro-

vided a weight motor with intermediate speeding up gearing for rotating the shaft 8. This is a most simple and effective driving device which may be easily wound up by pulling the weight 23 to hoist the weight 21. This winding up is quickly done and independently of driving through the gearing for the ratchet wheel runs away from the pawl 15 in this operation, while in the running or normal operation, the driving by the weight 21 of the shaft 14 and ratchet wheel 17 is through the pawl 15, to rotate the worm wheel 14 and the shaft 8.

Fast on the shaft 8 above the box 1 is the disk record carrier or platform 24 upon which may be mounted a disk record 25. Projecting from the lower side of this carrier 24 are pins 26 entering openings 27 (Fig. 3) in the arms 28 extending from the friction disk or rotatable brake element 29. This brake element 29 is positioned automatically by the centrifugal speed regulator. Pivotally mounted by the ears 30 on the underside of the carrier 24 are the fly weights 31 having the fingers 32 coacting to force the disk 29 downward as the weights move outward, while the fly weight extensions 33 serve to lift this disk 29 when the weights move inwardly upon speed slackening.

Opposing the disk 29 is the non-rotatable friction disk or brake element 34 having the collar 35 disposed just above the collar 36 fast on the shaft 8, so that vertical adjustment of the shaft 8 through the step bearing or screw 12 may determine the distance apart of the brake element disks, and accordingly fix the speed at which the fly weights begin checking action upon the rotative speed of the carrier 24.

For supplemental adjustment of the speed for braking or actually stopping the carrier 24, the lever 37 may be operated or set as to the segment 38.

The device is compact and simple for refined operation, and disposal of the arm at one corner of the support permits use of a larger diameter record with a small size box.

What is claimed and it is desired to secure by Letters Patent is:

1. A centrifugal speed regulator for sound reproducers embodying a shaft, a rotatable record platform carrier mounted on the shaft, flyweights carried by and radially

spaced from the shaft by the carrier, a brake ring sustained by the flyweights, and an opposing brake member with which the ring may coact.

- 5 2. A centrifugal speed regulator for sound reproducers embodying a shaft, a rotatable record platform carrier mounted on the shaft, a friction brake for the carrier including a brake ring having radial extensions, flyweights carried by and radially spaced from the shaft by the carrier, for operating the brake ring by coacting with the radial extensions thereof, and an opposing non-rotatable brake ring.
- 10 3. A centrifugal speed regulator for sound reproducers embodying a shaft, a rotatable record platform carrier mounted on the shaft, a friction brake for the carrier including a brake ring disposed adjacent the carrier, flyweights mounted on and within the platform radius of the carrier and provided with extensions for moving the brake ring, said flyweights being spaced from the shaft by the carrier, an opposing non-rotatable brake ring, and means for adjusting the non-rotatable brake ring.
- 15 4. A centrifugal speed regulator for sound reproducers embodying a shaft, a rotatable platform carrier mounted on the

shaft, a friction disk movable with the carrier, an opposing non-rotatable disk, and flyweight means mounted on and within the platform radius of the carrier, said flyweight means being spaced from the shaft by the carrier, said friction disk and flyweight means having coacting radially disposed extensions to move the disks relatively into braking position.

5. A centrifugal speed regulator for sound reproducers embodying a shaft, a rotatable record platform carrier mounted on the shaft, an opposing non-rotatable brake element, means for adjusting the carrier relatively to the brake element, and centrifugal speed regulator means mounted on and within the platform radius of the carrier including flyweights spaced by the carrier from the shaft and having extensions, and an annular member having radial extensions engageable by the flyweight extensions in shifting the annular member into coacting position with the brake element.

In testimony whereof I affix my signature in the presence of two witnesses.

HUBERT A. MYERS.

Witnesses:

GEO. E. KIRK,  
C. H. RAUCH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

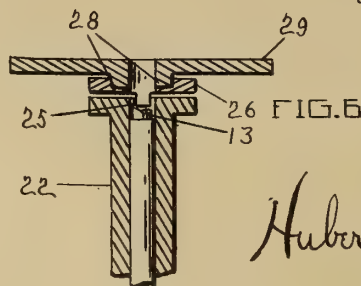
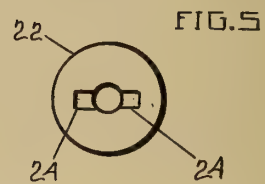
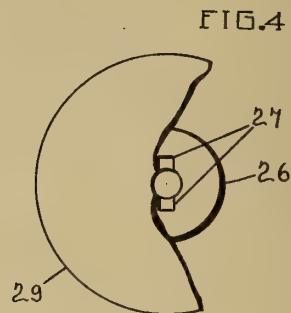
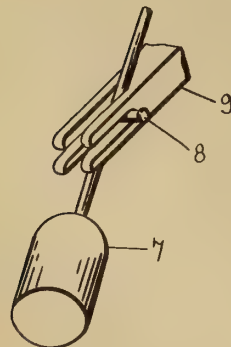
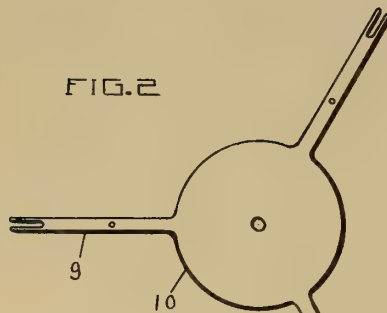
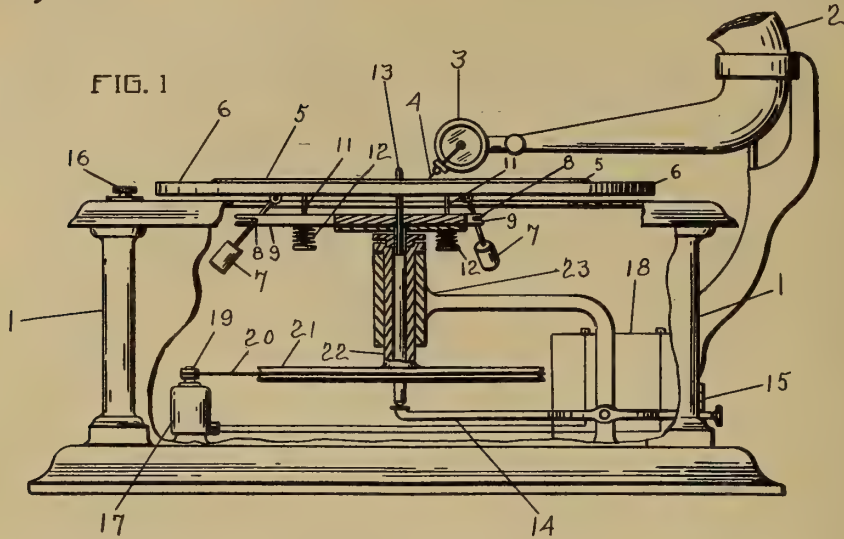
RECORD CONTROLLING MECHANISM,  
#1,224,092-----H. A. Myers,  
Patented-April 24th, 1917.  
Filed-July 30th, 1915.



H. A. MYERS.  
 RECORD CONTROLLING MECHANISM.  
 APPLICATION FILED JULY 30, 1915.

1,224,092.

Patented Apr. 24, 1917.



INVENTOR  
*Hubert A. Myers*  
 BY  
*Geo. E. Myers*  
 ATTORNEY

# UNITED STATES PATENT OFFICE.

HUBERT A. MYERS, OF TOLEDO, OHIO.

## RECORD-CONTROLLING MECHANISM.

1,224,092.

Specification of Letters Patent.

Patented Apr. 24, 1917.

Application filed July 30, 1915. Serial No. 42,699.

*To all whom it may concern:*

Be it known that I, HUBERT A. MYERS, a citizen of the United States of America, residing at Toledo, Lucas county, Ohio, have  
5 invented a new and useful Record-Controlling Mechanism, of which the following is a specification.

This invention relates to features of driving and control of rotatable record members.

10 This invention has utility when incorporated in machines.

Referring to the drawings:

Figure 1 is a side elevation, with parts broken away, showing an embodiment of the  
15 invention in a talking machine;

Fig. 2 is a top plan view of the fly weight shifted friction disk;

Fig. 3 is a fragmentary detail, in perspective, of the connection of a fly weight to the  
20 friction disk arm;

Fig. 4 is a fragmentary plan view of the driving friction disk and its rocking coupling;

Fig. 5 is a plan view of the rocking coupling connection on the driving sleeve, and  
25 pling connection on the driving sleeve, and

Fig. 6 is a vertical section on an enlarged scale of the driving disk and its mounting at right angles to the showing in Fig. 1.

The talking machine comprises the cabinet or box 1 upon which is mounted the amplifier 2 having the sound box 3 carrying the needle 4 adjacent the disk record 5 for reproduction therefrom or production thereon.  
30

The disk 5 is mounted on the record carrier 6 centrally of the cabinet 1. Pivotaly mounted on the lower side of the carrier 6 are the fly weights 7 of the speed regulator. These fly weights have connection through the pins 8 with the forked arms 9 of the  
40 shiftable clutch or friction disk 10 disposed coaxially with the rotatable carrier 6. To render the action of the fly weights more sensitive, pins 11 from the carrier 6 have springs 12 thereon tending to lift the disk  
45 10, so that when the desired driving speed is exceeded the disconnection is at once effected and complete.

The carrier 6 is mounted on the shaft or support 13 stepped in the lever 14 adjustable  
50 to engage different teeth 15 and thereby vary the position of the friction disk 10 and accordingly the speed incident to the clutch control.

The switch 16 may be rotated to close the  
55 circuit for starting the electric motor 17

from the source of electric current, as the battery 18. The motor 17 has the pulley 19 actuating the driving belt 20 for the driver 21 fast on the sleeve 22 coaxial with the carrier 6 and centering the carrier supporting  
60 shaft 13. This sleeve 22 is mounted in the bearing 23. The upper extremity of the sleeve 22 has recesses 24 diametrically disposed for receiving projections 25 on the coupling 26, while at 90° from these pro-  
65 jections 25, but on the opposite side of the coupling 26 are the diametrically disposed recesses 27 for receiving the projections 28 of the lower or driving friction disk 29. These projections and recesses form a rock-  
70 ing connection insuring the lower disk 29 alining up in its clutch coaction with the upper opposing disk 10. The direct drive of the actuating motor 17 is thus automatically modified to insure uniform rotative  
75 speed for the carrier 6 at such adjusted rate as may be determined upon by the positioning of the lever 14.

What is claimed and it is desired to secure by Letters Patent is:

1. A rotatable record carrier, a vertical coaxial relatively independently rotatable driver therefor embodying a clutch member, a second clutch member rotatable with the carrier, and fly weights directly mounted  
85 on the carrier and having coaction with one of the clutch members to move it out of and into engagement with the other clutch member.

2. A rotatable record carrier, a shaft  
90 therefor, fly weights directly mounted upon the carrier within the radial extent thereof independently of the shaft and spaced therefrom, a vertically coaxial friction disk carried by the carrier and provided with exten-  
95 sions engageable by the fly weights whereby the friction disk is shiftable by the fly weights, and an opposing driving friction disk for actuating the fly weight shifted  
100 disk.

3. A rotatable record carrier, a shaft therefor, fly weights directly mounted on the under side of the carrier independently of the shaft and spaced therefrom, a driver embodying a clutch member, a second clutch  
105 member normally yieldably sustained by the carrier, and fly weights for shifting the yieldably sustained clutch member from and toward the driving clutch member.

4. A rotatable record carrier, a shaft 110

therefor, fly weights directly mounted on the under side of the carrier independently of the shaft and spaced therefrom, a driver embodying a friction member, a second friction member normally yieldably sustained by the carrier, and fly weights for shifting the yieldably sustained friction member from and toward the driving clutch member.

5  
10  
15  
5. A rotatable record carrier, fly weights directly mounted on the under side of the carrier, a driver embodying a friction member, a second friction member normally yieldably sustained by the carrier, fly weights for shifting the yieldably sustained friction member from and toward the driving clutch member, and an adjustable sup-

port for the carrier including means for varying the action of the friction member.

6. A rotatable record carrier, a shaft therefor, fly weights directly mounted on the under side of the carrier independently of the shaft and spaced therefrom, a driver embodying a friction member, a second friction member normally yieldably sustained by the carrier, and fly weights for shifting the yieldably sustained friction member from and toward the driving clutch member, there being a self adjusting alining carrying connection for one of said friction members.

In witness whereof I affix my signature.

HUBERT A. MYERS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



ACOUSTIC DIAPHRAGM,  
#1,224,102-----W.W.Young,  
Patented-April 24th, 1917.  
Filed-June 1st, 1916.

W. W. YOUNG.  
ACOUSTIC DIAPHRAGM.  
APPLICATION FILED JUNE 1, 1916.

1,224,102.

Patented Apr. 24, 1917.



FIG. 1.



FIG. 2.

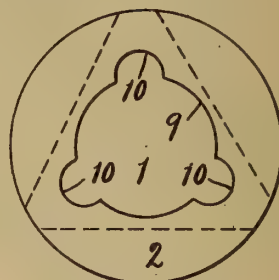


FIG. 3.



FIG. 4.

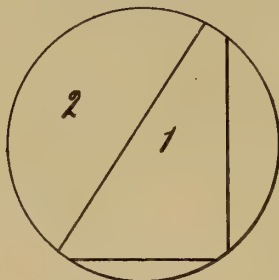


FIG. 5.

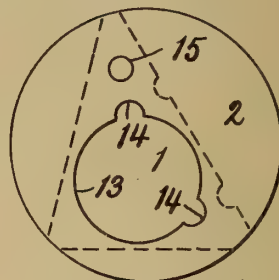


FIG. 6.

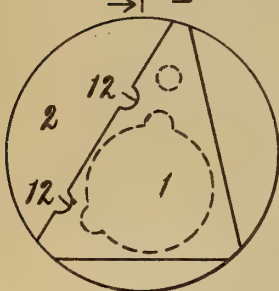


FIG. 7.

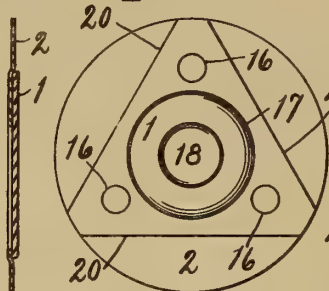


FIG. 8.

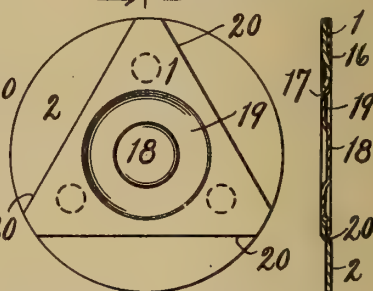
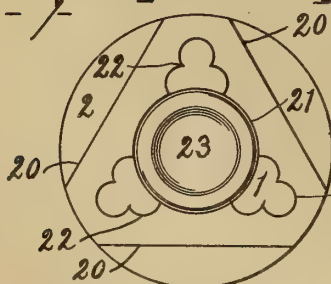


FIG. 9.



WITNESS

FIG. 10.



FIG. 11.

A. C. Fairbanks

INVENTOR.  
William W. Young,  
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Frank A. Cutter,  
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# UNITED STATES PATENT OFFICE.

WILLIAM W. YOUNG, OF AGAWAM, MASSACHUSETTS, ASSIGNOR TO L. A. YOUNG, OF AGAWAM, MASSACHUSETTS.

## ACOUSTIC DIAPHRAGM.

1,224,102.

Specification of Letters Patent.

Patented Apr. 24, 1917.

Application filed June 1, 1916. Serial No. 101,182.

*To all whom it may concern:*

Be it known that I, WILLIAM W. YOUNG, a citizen of the United States of America, residing at Agawam, in the county of Hampden and State of Massachusetts, have invented a new and useful Acoustic Diaphragm, of which the following is a specification.

My invention relates to improvements in diaphragms for use in telephones, talking-machines, and the like, to reproduce sound, and consists essentially of a metallic, fibrous, or other vibratory member or bridge having points of suspension at the outer terminals of parts which extend from a central portion of greater or less area, and a metallic, fibrous, or other reproducing member or resonator. The bridge and resonator of any diaphragm may be of the same or different thickness, and either or both may or may not be perforated. The shape of the bridge may vary to a considerable extent, but whatever such shape may be, I find that three points of suspension give the best results.

The primary object of my invention is to produce a sound-reproducing device or diaphragm, applicable to or capable of being incorporated with any sound-reproducing instrument requiring a diaphragm, which is sufficiently sensitive to respond to the weaker vibrations, sufficiently strong and rigid to carry the stronger vibrations without blasting, rattling, or flattening out, and gives out or reproduces, under practically all conditions, sound waves that are full, clear, round, and natural. Even blasts on high vocal and instrumental notes, which are so common with ordinary diaphragms, are entirely eliminated or avoided by this diaphragm. These results are due to the suspended vibratory member or bridge provided with the reproducing member or resonator, since said bridge, with its larger central area and extensions therefrom which are supported at their outer ends or edges by the diaphragm-engaging and holding parts of the sound-reproducing instrument in which said diaphragm is located, is very elastic and sensitive to vibrations, and especially adapted to transmit the same without variation to said resonator, on the one hand, and said resonator, because of its shape, area, and position relative to said bridge, cushions, as it were, the vibrations received by it, and at the same time ac-

curately reproduces such vibrations in the form of sound waves, on the other hand.

Other objects and advantages will appear in the course of the following description.

I attain the objects and secure the advantages of my invention by the means illustrated in the accompanying drawings, in which—

Figures 1 and 2 are plans of what may be termed obverse and reverse sides, respectively, of a diaphragm which embodies a practical form of the invention; Figs. 3 and 4 are similar plans of another practical form or embodiment of said invention; Fig. 5 is a reverse plan of still another embodiment of the invention; Figs. 6 and 7 are respectively obverse and reverse plans of a fourth diaphragm which like the others embodies the invention; Fig. 8 is a vertical section taken on lines 8—8, looking in the direction of the associated arrow, in Fig. 7; Figs. 9 and 10 are respectively obverse and reverse plans of a fifth example of the application of the invention; Fig. 11 is a vertical section on lines 11—11, looking in the direction of the associated arrow, Fig. 10, and, Figs. 12 and 13 are respectively obverse and reverse plans of a sixth example.

Similar reference numerals designate similar parts throughout the several views.

I have not by any means illustrated all of the shapes or forms that are available for my diaphragm and its two essential elements, but have shown a sufficient number fully to disclose my invention.

The bridge of a diaphragm for a telephone receiver being the part that comes into contact with the magnet in said receiver, it becomes necessary that such bridge be of metal, but in other cases bridges of metal, fiber, or other material may be employed, according to the demands of structural and other conditions.

In each example of the diaphragm illustrated in connection herewith, a bridge is indicated by the numeral 1 and a resonator by the numeral 2. These two members are present in every diaphragm, the first being on what I have termed the reverse side and the second being on what I have termed the obverse side.

Comparatively thin material is used for both the bridge 1 and the resonator 2 which comprise each diaphragm. Sometimes the bridge is thicker than the resonator, as in



the diaphragm shown in Figs. 6, 7 and 8, and sometimes the bridge is thinner than the resonator, as in the diaphragm shown in Figs. 9, 10 and 11, but such differences in thickness are necessarily comparatively slight, and frequently there is no difference in thickness between the two members.

In the diaphragm shown in the first two views, the bridge 1 has three tangential arms 3 which constitute the three points of suspension, and the resonator 2 has a large central opening 4 covered by the central or main part of said bridge, and three small openings 5 covered by said arms. The outer ends of the arms 3, with the outer edge of the resonator 2, are, when the diaphragm is in place, held by the engaging parts (not shown) of the sound-reproducing device of a talking machine or of a telephone, and the bridge 1 thus supported receives the vibrations and transmits them to said resonator, which in turn reproduces them in sound-waves of superior quality. The bridge 1 being weaker at its extremities is possessed of the necessary flexibility, and the openings 4 and 5 in the resonator render the latter more flexible and make it capable of giving off the sound with the desired degree of volume and tone. The arms 3 may be indented more or less to enhance the action of the bridge, as shown at 6, and the large opening in the resonator may have extensions 7 to improve the result to be obtained from said resonator.

In this as in all other cases the bridge 1 and the resonator 2 are cemented or otherwise securely attached to each other.

The desired results are attained with the diaphragm shown in Figs. 3 and 4, by employing an equilaterally triangular bridge 1 having its points or angles cut off to provide adequate points of suspension. There is here present the central portion of larger area, as in the first diaphragm, and outwardly extending diminishing parts which correspond in a general way with the arms 3, and the resonator 2 has a central opening 9 and extensions 10 covered by the bridge 1, such opening and extensions being somewhat larger than the opening 4 and extensions 7.

In the Fig. 5 diaphragm, the bridge 1 is in the form of a right-angle triangle having its angles removed for a similar reason as before. The resonator 2 is so attached to this bridge that unequal portions of said resonator extend beyond the three side edges of said bridge. There are no indentations or perforations in either the bridge or the resonator in this example. Again is to be found the central bridge portion of larger area, and the diminishing outlying parts that serve as the points of suspension of the bridge, together with the attached resonator, and the same thing is true of the succeeding examples.

Since the Fig. 5 resonator 2 is imperforate, it is conceived to be feasible to leave a considerable undivided area thereof unsupported by the bridge, as has been done, in order to obtain the desired action on the part of said resonator.

The same general relative arrangement of the bridge 1 and the resonator 2, in the diaphragm shown in Figs. 6, 7 and 8, obtains as in the preceding example, but here the bridge is an acute-angled triangle and has indentations 12 in its longest side, similar to the indentations 6 in the first bridge, and the resonator has a large opening 13 with two extensions 14, and a small opening 15. The openings 13 and 15 and the extensions 14 are all covered by the bridge, said extensions and said opening 15 being located adjacent to the longest side of said bridge, and said opening 13 being necessarily offset relative to the center of the resonator.

In the diaphragm shown in Figs. 9, 10 and 11, the bridge 1 is an equilateral triangle without points, and has openings 16 adjacent to its ends into which are forced or pressed contiguous portions of the resonator 2, and the latter has a large central opening 17 into which is pressed the corresponding portion of said bridge. A boss 18 is left in the center of the indented central portion of the bridge 1, thus leaving an annular channel 19 in the reverse side of said bridge.

The bridge may be countersunk in the reverse side of the resonator, if desired, instead of having the latter merely placed flat against the former without indentation in the contiguous surface of either. The diaphragm last above described is an example of such a countersunk bridge, which bridge is let into the resonator along lines 20 in Figs. 9 and 10, and as represented at 20 in Fig. 11.

Another example of a diaphragm having its bridge countersunk in the resonator appears in the last two views, the outlines of the countersink being indicated, as in Figs. 9 and 10, by the numeral 20. The diaphragm of Figs. 12 and 13 is generally very similar to the preceding one, the principal difference being that in the last diaphragm a central opening 21 in the resonator 2 has trefoil extensions 22, and there are no openings 16 in the bridge 1. The central portion of the bridge is here, as in the other case, pressed into the opening 21 and formed into a boss 23 in the center and an annular channel 24 between said boss and the edges of said opening.

Any of the diaphragms illustrated in the drawings, in addition to the last two, may have countersunk bridges.

From the foregoing it is clear that I should not be unduly restricted by what I have illustrated in the drawings.

One of the principal reasons for perforating the resonators is for the purpose of reducing the mass of material in the diaphragms. Since the diaphragms must be practically airtight, any opening through a resonator must be covered by the attached bridge or other means.

What I claim as my invention, and desire to secure by Letters Patent, is—

10 1. An acoustic diaphragm comprising a vibratory member consisting of a central portion with extensions therefrom to form points of suspension, and a perforated reproducing member attached to said first-mentioned member, said vibratory member covering the perforation in said reproducing member.

20 2. An acoustic diaphragm comprising a vibratory member consisting of a central portion with extensions therefrom to form points of suspension, and a perforated reproducing member attached to said vibratory member, said first-mentioned member covering the perforation and in part being upset into said reproducing member.

25 3. An acoustic diaphragm comprising a vibratory member consisting of a central

portion having extensions to form a plurality of points of suspension, and a reproducing member attached to said vibratory member, the latter being of less area than and countersunk in said reproducing member.

4. An acoustic diaphragm comprising a vibratory member consisting of a central portion with extensions therefrom to form points of suspension, and a perforated reproducing member attached to said vibratory member, said vibratory member covering the perforation and being countersunk in said reproducing member.

5. An acoustic diaphragm comprising a vibratory member consisting of a central portion with extensions therefrom to form points of suspension, and a perforated reproducing member attached to said vibratory member, said vibratory member covering the perforation and being countersunk and in part upset in said reproducing member.

WILLIAM W. YOUNG.

Witnesses:

F. A. CUTTER,

A. C. FAIRBANKS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



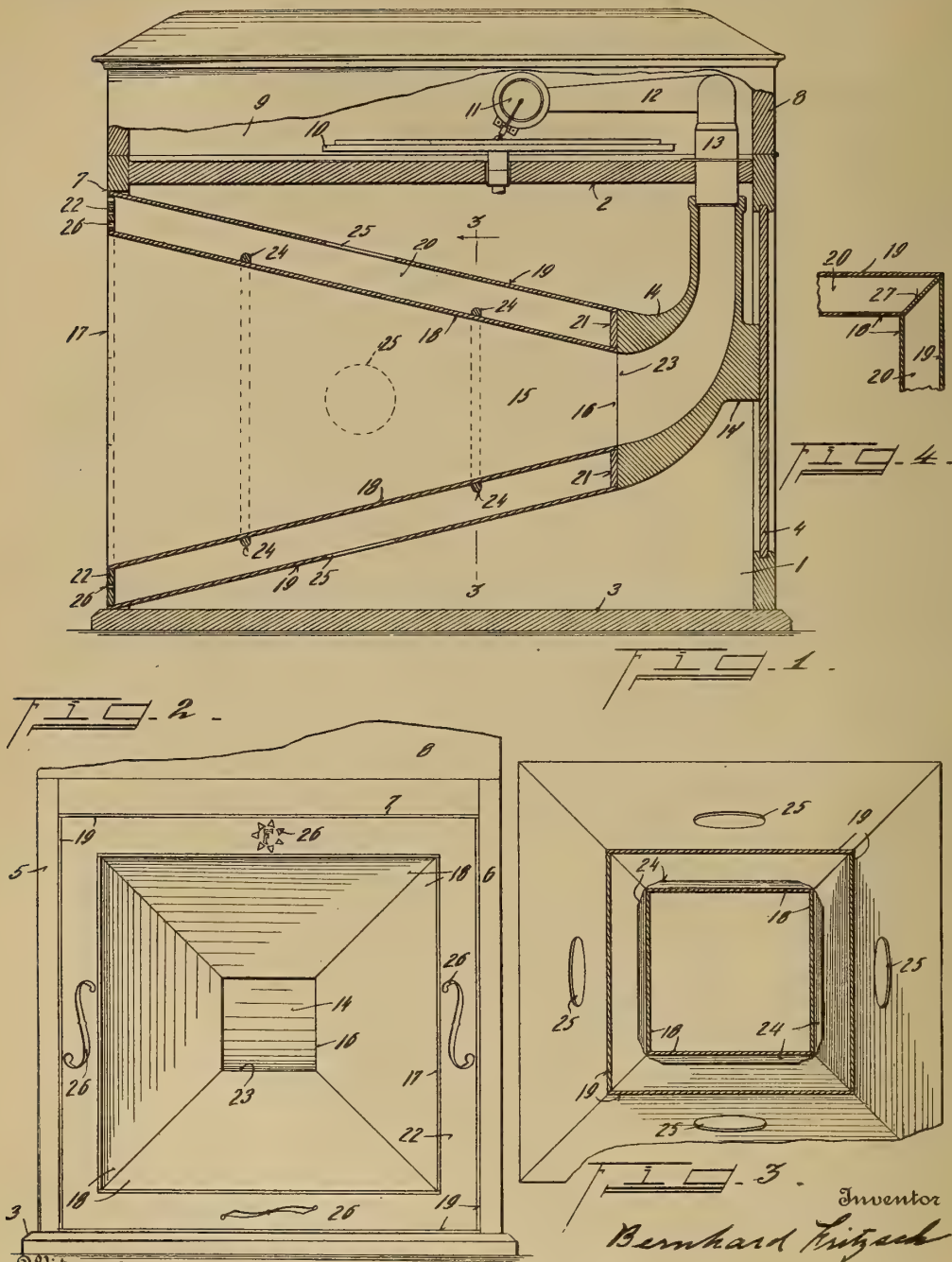


SOUND AMPLIFIER,  
#1,223,338-----B. Fritzsche,  
Patented-April 17th, 1917.  
Filed-June 5th, 1916.

B. FRITZSCH.  
SOUND AMPLIFIER.  
APPLICATION FILED JUNE 5, 1916.

1,223,338.

Patented Apr. 17, 1917.



Witnesses

*C. B. Foster.*  
*L. A. Beck*

By

Inventor  
*Bernhard Fritzsch*  
*Ward & Ward*

Attorneys

# UNITED STATES PATENT OFFICE.

BERNHARD FRITZSCH, OF CINCINNATI, OHIO.

SOUND-AMPLIFIER.

1,223,338.

Specification of Letters Patent.

Patented Apr. 17, 1917.

Application filed June 5, 1916. Serial No. 101,669.

*To all whom it may concern:*

Be it known that I, BERNHARD FRITZSCH, a citizen of the United States, and residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and useful Improvement in Sound-Amplifiers, of which the following specification is a full disclosure.

My invention relates to an improved tone chamber or sound amplifying compartment for a phonograph, having superior properties in relation to either the recording or reproducing of sound.

The object of the invention is to so construct the chamber communicating with the sound tube, that it will not only amplify the volume of sound materially, but will also serve as a factor or an influence in the correct recording or reproducing of musical tones with their true and full values.

To this end, I have devised a tone chamber embodying the principles of a musical instrument structure, such as the violin, zither or guitar type, or combining the more desirable characteristics of several different musical instruments, with a unitary tone value result.

In general, attempts to amplify the sound waves have been at the expense of tone effect, while I have succeeded in increasing the volume while preserving the characteristic over-tones of the voice or instrument.

The features of the invention will be more fully set forth in the description of the accompanying drawings, forming a part of this specification, in which:—

Figure 1 is a central vertical section through the instrument.

Fig. 2 is a front elevation.

Fig. 3 is a section through the tone chamber on line 3—3, Fig. 1.

Fig. 4 is a detailed section of one corner of a modified form of tone chamber.

In the drawings, I have not shown the motor but a box or cabinet in which the operative parts are disposed as usual. The cabinet has a large main compartment 1, forming an indirect tone chamber in which the direct tone chamber is located. As shown, the chamber 1 is defined by a top 2, bottom 3, back 4, sides 5 and 6, being open at the front end 7. A tray-lid 8 is hinged to the back forming a compartment 9, in which is the turn-table 10, on the piece 2, a sound-box or reproducer 11, and a horizontally pivotally swinging sound-arm 12, ta-

pering appropriately and having a vertical rear end 13 passing downward through the piece 2 into compartment 1, where it communicates with a sound tube or throat 14, having a boss 14', secured to the back 4.

The direct or tone chamber proper 15, has a reduced open rear end 16 communicating with the sound tube 14, and an enlarged open front end 17 at the open end of the main compartment.

Preferably the tone chamber is in the general shape of the frustum of a pyramid, having forwardly diverging walls, although the matter as to whether the cross section is circular or polygonal is not of the essence of the invention.

The tone chamber is double walled, formed of thin sounding board material, such as wood of the quality and dimensions employed in violin or zither structures. As preferred and shown, the chamber walls are formed by flat sounding boards, four sided, and jointed at their meeting edges respectively. So, the inner wall member 18 of the tone chamber is formed of four flat sounding boards, and the outer wall member 19 is also formed of four flat sounding boards, the outer and inner walls being uniformly spaced apart to provide the sound pocket 20, closed at the rear ends by members 21, and at the front ends by members 22.

The mouth 23 of the throat has a cross-section to correspond with the reduced end of the tone chamber, and the throat and reduced end of the chamber are secured together to form a continuous and uniformly diverging sound conduit. Preferably the inner wall is transversely reinforced by rigid bars 24, and preferably the outer or inner walls, or both, are formed with sound holes or apertures 25, these being shown for illustration, only in the outer walls, and preferably, also, the front members 22 are formed with sound apertures 26 at the front of the cabinet.

If desired, the double walls may be provided with the diagonal partitions 27 (see Fig. 4) so that the tone chamber is constituted by a plurality of instrument bodies, each resembling a violin in structure and tone quality.

While increasing the sound volume, the fullness and roundness of the tone is preserved. The walls reverberate under the sound-wave influence exactly as they do when an instrument is played, so that the



overtones are individualized and fully recorded or reproduced.

The sound waves set into vibration by the reproducer are transmitted through the tubular sound arm 12 and through the sound conductor 14 to the amplifying resonator surrounded by resonating chamber or chambers. The sound conductor 14 is rigid so that sound waves will be conveyed from the sound box to the resonant body of the amplifier without loss of energy.

The resonant sound boards or sides of the amplifier are vibrated and the relative opposite walls are set into sympathetic vibration with and by the sound waves passing through the central amplifier passage leading from the sound box and by the vibration of these sound walls, the sounds corresponding to the vibration are reproduced and augmented. These inner amplifier walls being of thin resonant material are each strengthened by spaced cross-bars, adding resonance to produce solid tones and avoid undue vibration, and thus all harsh or sudden noises due to irregular or discontinuous vibration are modified to musical sounds or tones. By making the amplifier of rectangular form, tapering from the inlet end outwardly toward the outlet end, with each wall of a resonant material, its range is materially increased and quality of sound improved with all metallic or hard sound or noises eliminated.

The amplifier is surrounded by a resonating chamber or chambers, constituted by the spaced double walls, to form an intermediate unconfined chamber closed at the inlet end of the amplifier by a rigid end wall, as not to be in communication with the rigid sound conductor, so that no direct sound waves from the reproducer can be admitted.

In the arrangement shown with the amplifier of square form in cross section, each side has two parallel walls of resonant material spaced apart with the outside wall apertured, and the intermediate chamber open at its front end, through apertures in the front end wall. The companion walls form horn or trumpet amplifiers for conveying sound waves, resulting from the vibration of the walls and they are set into sympathetic vibration to augment and emit tones which otherwise would be lost. With one of the pair of resonant walls apertured to conform to a musical instrument, provided with a sound hole, gives greater elasticity and increases the volume of tone. Sound waves set up by instrument are discharged from the instrument directly from the sound-box through the central passage, others through the resonant chamber or chambers surrounding such central passage and thus rendered audible are not lost within the cabinet of the machine. Harsh noises are either eliminated or modified to musical

tones, so that in the whole, sounds are emitted more agreeable to the ear and with a more accurate and mellow reproduction of sound.

It is obvious that the contour or shape or proportions of the double wall tone chamber can be variously modified in view of this disclosure without departing from the principles of the invention.

I have found that the musical values of the voice or instruments, alone or combined, are materially amplified and improved when transmitted through a tone chamber embodying the principles and characteristics herein disclosed.

Having described my invention, I claim:

1. In a talking machine, in combination, a sound conduit, a double walled resonant sound amplifier formed with a central passage-way communicating at one end with said conduit, said double walled construction forming a resonant chamber as an unconfined air space surrounding the passage-way and non-communicative with said conduit.

2. In a talking machine, a sound conduit, and a hollow sound amplifying body comprising a resonant walled structure forming a sound passage communicating with said conduit, with a resonant chamber as an unconfined air space around said passage non-communicating with said conduit.

3. In a talking machine, a sound amplifier of hollow walled structure formed with a central sound passage-way and resonating amplifying chamber as an unconfined air space about said central passage-way non-communicative with said passage-way for emitting sound waves set off by the vibration of the walls.

4. In a talking machine, a tapering sound conduit, a sound amplifying body having its sides each of double parallel walls spaced apart, forming a central amplifying sound passage communicating with said sound conduit, and the space between the walls, a resonator chamber open at its forward end and non-communicating with said sound conduit for amplifying sound waves set up by the vibration of said walls, or one of them.

5. In a talking machine, a sound conduit, a sound amplifying body having its sides each of double walls spaced apart and of resonant material, the outer wall provided with a sound hole, said double walled sides forming a central sound amplifying passage communicating with said conduit and continuous therewith, and each side a resonating amplifying chamber non-communicating with said conduit.

6. In a talking machine, a sound conduit, a sound amplifying body having its sides each of double walls of resonant material spaced apart and connected at the rear end

to close the chamber formed by said walls and open at the opposite end, and its companion outer wall apertured, said double walled sides forming a central sound passage connected with said conduit, and each 5 side a resonating chamber non-communicative with said conduit.

7. In a talking machine, a sound conduit, a sound amplifying body having its sides each of double walls of resonant material spaced apart and connected at the rear end to close the chamber formed by said walls 10 and open at the opposite end, said double walled sides forming a central sound passage connected with said conduit, and each 15 side a resonating chamber non-communicative with said conduit.

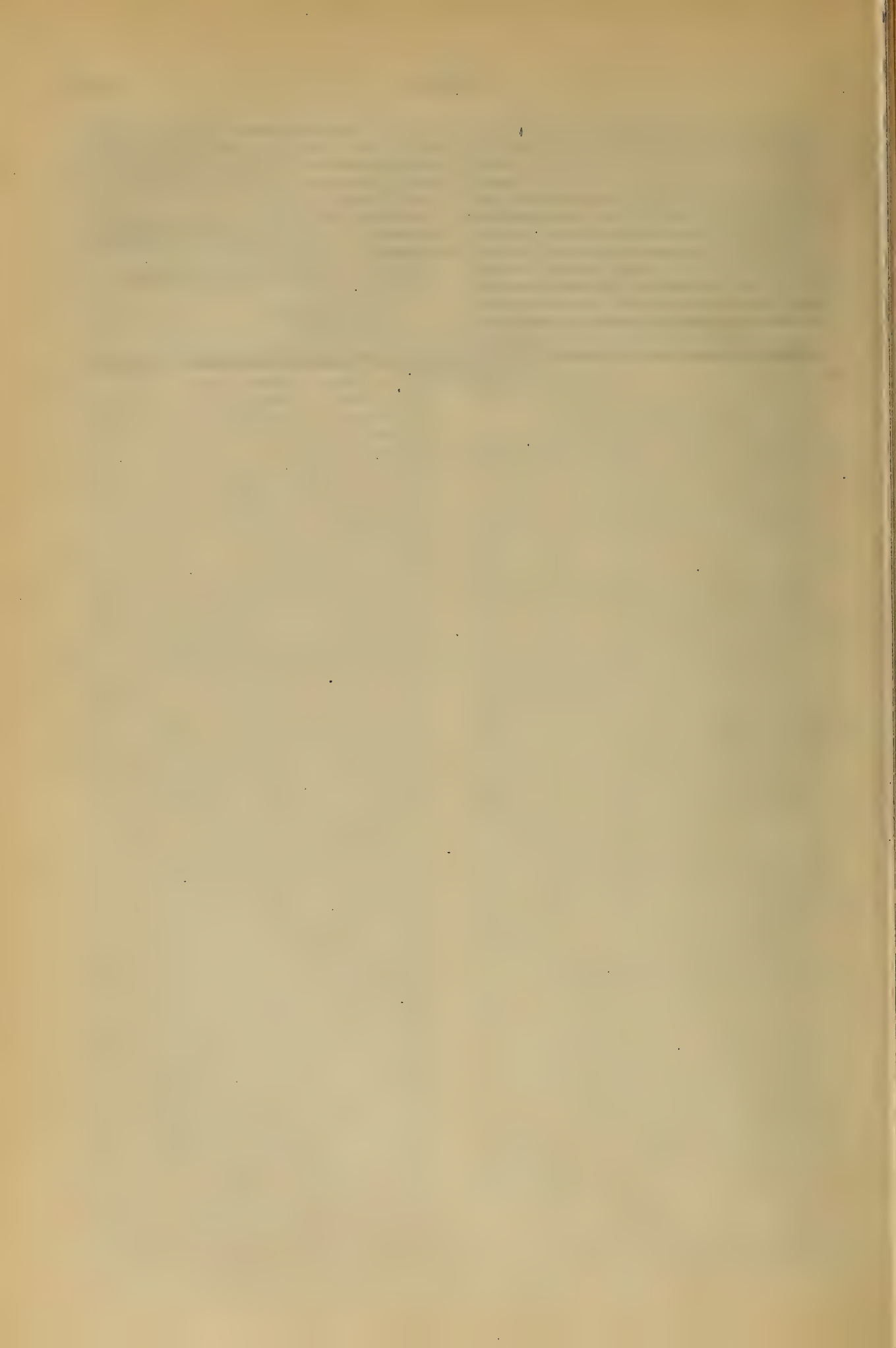
In witness whereof, I hereunto subscribe my name, as attested by the two subscribing witnesses.

BERNHARD FRITZSCH.

Witnesses:

EMMA SPENER,  
L. A. BECK.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



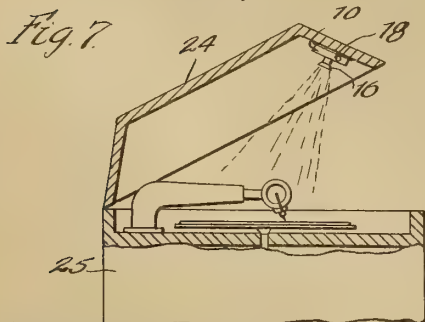
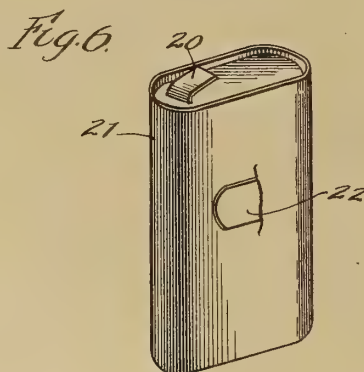
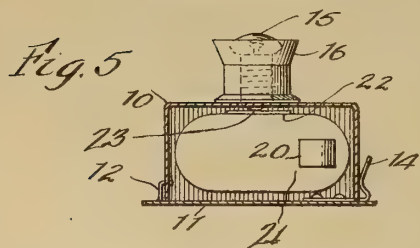
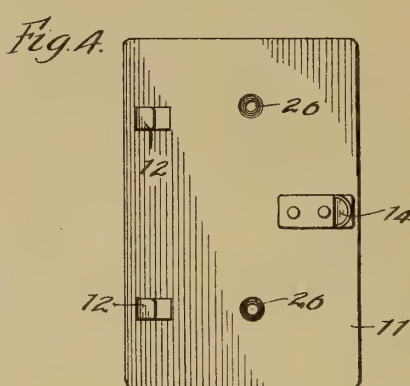
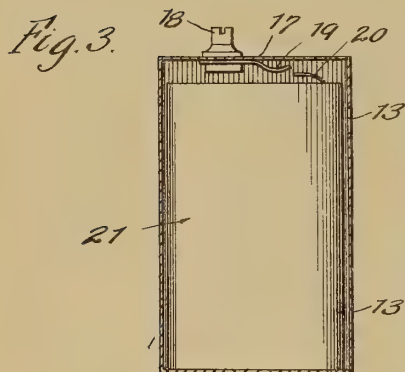
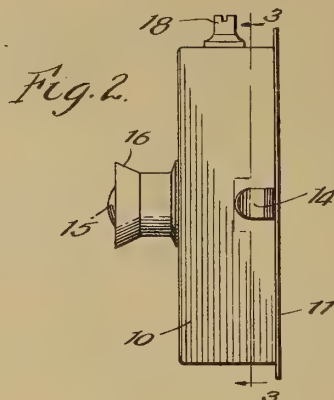
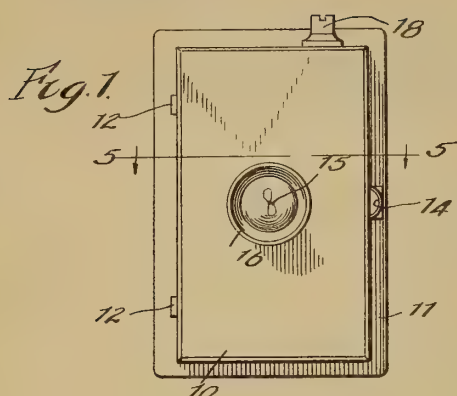


FLASH LIGHT,  
#1,224,215-----O.L. Scalbom,  
Patented-May 1st, 1917.  
Filed-September 8, 1916.

O. L. SCALBOM.  
FLASH LIGHT.  
APPLICATION FILED SEPT. 8, 1916.

1,224,215.

Patented May 1, 1917.



Witnesses.  
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Inventor.  
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By. *[Signature]* Atty.

# UNITED STATES PATENT OFFICE.

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## FLASH-LIGHT.

1,224,215.

Specification of Letters Patent.

Patented May 1, 1917.

Application filed September 8, 1916. Serial No. 118,960.

### *To all whom it may concern:*

Be it known that I, OSCAR L. SCALBOM, a citizen of the United States, residing at Glenview, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Flash-Lights, of which the following is a specification.

This invention relates to improvements in lights, commonly known as "flash lights", and one of the objects of the invention is to provide an improved self-contained device of this character in which a battery is removably housed within an open casing, the casing being provided with a closure, and provisions whereby the casing may be secured to a support or within an inclosure in such a manner that the casing may be opened to gain access to the battery to renew the same, without entirely detaching all of the parts from the support.

A further object is to provide an improved device of this character embodying a make and break device for the light circuit whereby the light may be controlled at will from the exterior of the casing.

A further object is to provide an improved device of this character which will be light, simple, durable and cheap in construction and effective and efficient in operation.

To the attainment of these ends and the accomplishment of other new and useful objects as will appear, the invention consists in the features of novelty in substantially the construction, combination and arrangement of the several parts hereinafter more fully described and claimed and shown in the accompanying drawings illustrating the invention and in which—

Figure 1 is a front elevation of an improved device of this character constructed in accordance with the principles of this invention.

Fig. 2 is a side elevation of the parts shown in Fig. 1.

Fig. 3 is a sectional view taken on line 3—3, Fig. 2.

Fig. 4 is an elevation showing the closure of the casing and which closure is secured to the support for holding the parts in position.

Fig. 5 is a sectional view taken on line 5—5, Fig. 1.

Fig. 6 is a detail perspective view of the battery.

Fig. 7 is a detail diagrammatic sectional view showing one adaptation of this invention.

Referring more particularly to the drawing, the numeral 10 designates a casing having one of its walls formed by a closure 11 and in the present form of the invention, the casing proper is of a box-like formation and is removably secured to the closure preferably by means of hooked shaped portions 12 and which portions 12 are adapted to engage in openings 13 in one of the side walls of the casing adjacent the end thereof. A spring catch 14 is provided for securing the other side of the closure 11 to another wall of the casing 10, so that when it is desired to gain access to the interior of the casing, all that is necessary is to adjust the catch 14 and then remove the hooked shaped portions 12 of the closure from the openings 13. Obviously the casing and closure may be secured together in any suitable manner.

One of the casing walls is provided with an opening therethrough and in which opening is arranged a light socket adapted to receive a light 15 and surrounding this socket and the light is a guard or shield 16, for protecting the light.

One of the casing walls is provided with a slot 17 through which a handle 18 extends and which handle is connected with a contact 19 for shifting the latter into and out of engagement with a cooperating contact 20 of a battery 21, and which battery is arranged within the casing. The other contact 22 of the battery 21 is preferably arranged adjacent the side of the battery and in such a position that the portion 23 of the light 15, when the light is secured in position, will engage therewith to complete the circuit through the light when the contacts 19 and 20 are in engagement.

When it is desired to extinguish the light, the contact 19 is shifted, to separate the contacts 19 and 20.

This improved construction is adapted to be secured within a casing or inclosure in any suitable manner, so that when the casing is opened, all that is necessary to illuminate the same is to shift the contact 19 into engagement with the contact 20.

It is often times desirable to use a light in places where it is not convenient for a regular service light on a circuit to be used,



such for instance as in phonograph cabinets, etc., and often times considerable inconvenience is occasioned owing to the absence of matches, etc. With the present invention, the light can be secured within the inclosure, such for instance as the cover 24 of a phonograph cabinet 25. The device is secured in position in the present form of the invention, by means of suitable fastening devices passed through openings 26 in the closure 11 and which closure constitutes an anchor plate to which the casing proper is adapted to be secured.

The closure 11 being secured in position to the support and when the battery is worn out, all that is necessary is to detach the casing 10 from the closure, remove the battery and simply place another one in the casing, then secure the casing to the closure and the parts will be in position for use.

It will also be manifest that this improved simple, compact device is not only self-contained, but may be secured in position within a casing in such a manner that it will be out of the way and yet convenient and handy when it is desired for use. It also enables the operator to adjust the needle or stylus of a phonograph in the dark, that is without the necessity of lighting the ordinary illuminating lights in the room.

Furthermore, this improved device may be used in many places where it is inconvenient to use the ordinary incandescent light.

What is claimed as new is:

1. A self contained flash light embodying an open casing of box like formation, a closure for the casing, interengaging means on the casing and closure for detachably securing the parts together, one of the parts being adapted to be secured to a support to constitute an anchor for the other part, a lamp socket connected with one of the walls of the casing and opening there-through, a lamp in the socket, a removable battery in the casing and in circuit with the lamp, and means for controlling the lamp.

2. A self contained flash light embodying an open box like casing, a closure for the casing, interengaging means on the closure and the casing for detachably securing the parts together, one of the parts being adapted to be secured to a support to constitute an anchor for the other part, a lamp socket connected with one of the walls of the casing and opening therethrough, a lamp in the socket, a removable battery in the casing and in circuit with the lamp, an annular shield secured to the casing and encompassing the lamp, and means for controlling the lamp.

3. A self-contained flash light embodying an open casing, a closure for the casing and detachable therefrom, one of the parts being

adapted to be secured to a support to constitute an anchor for the other part, said closure and casing being one provided with a lip and the other with an aperture for removably receiving the lip, and a catch device coöperating with the said lip and aperture for detachably securing the closure and casing together, a lamp connected with one of the walls of the casing and visible from the outside of the casing, a battery removably held in the casing and in circuit with the lamp, and a make and break device included in the lamp circuit and accessible from the outside of the casing.

4. A self-contained flash light embodying an open casing, a closure for the casing and detachable therefrom, one of the parts being adapted to be secured to a support to constitute an anchor for the other part, said closure and casing being one provided with a lip and the other with an aperture for removably receiving the lip, and a catch device coöperating with the said lip and aperture for detachably securing the closure and casing together, a lamp connected with one of the walls of the casing and visible from the outside of the casing, an annular imperforate shield connected with the casing and encompassing the lamp, a battery removably held in the casing and in circuit with the lamp, and a make and break device included in the lamp circuit, and accessible from the outside of the casing.

5. A self-contained light of the character described, embodying a box-like casing, having one or more apertures adjacent the free edge of one of the casing walls, a closure plate for the casing, one or more ears formed on the plate and adapted to detachably engage the casing through said openings, a catch connected with the plate and adapted to engage the casing for removably securing the parts together, said plate being adapted to be secured to a support to constitute an anchor for the casing, a lamp socket connected with one of the walls of the casing and opening therethrough, a lamp in the socket, a battery within the casing and in circuit with the lamp, and means for controlling the circuit from the exterior of the casing.

6. A self-contained light of the character described, embodying a box-like casing, having one or more apertures adjacent the free edge of one of the casing walls, a closure plate for the casing, one or more ears formed on the plate and adapted to detachably engage the casing through said openings, a catch connected with the plate and adapted to engage the casing for removably securing the parts together, said plate being adapted to be secured to a support to constitute an anchor for the casing, a lamp socket connected with one of the walls of the casing and opening therethrough, a

lamp in the socket, a battery within the casing and in circuit with the lamp, there being a slot in one wall of the casing, and a switch element extending through the slot and operable from the outside of the casing for controlling the circuit.

In testimony whereof I have signed my

name to this specification, in the presence of two subscribing witnesses, on this 6th day of September, A. D. 1916.

OSCAR L. SCALBOM.

Witnesses:

IRMA M. BARING,  
J. H. JOCHUM, JR.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





MOTOR CONTROLLING MECHANISM FOR  
TALKING MACHINES,

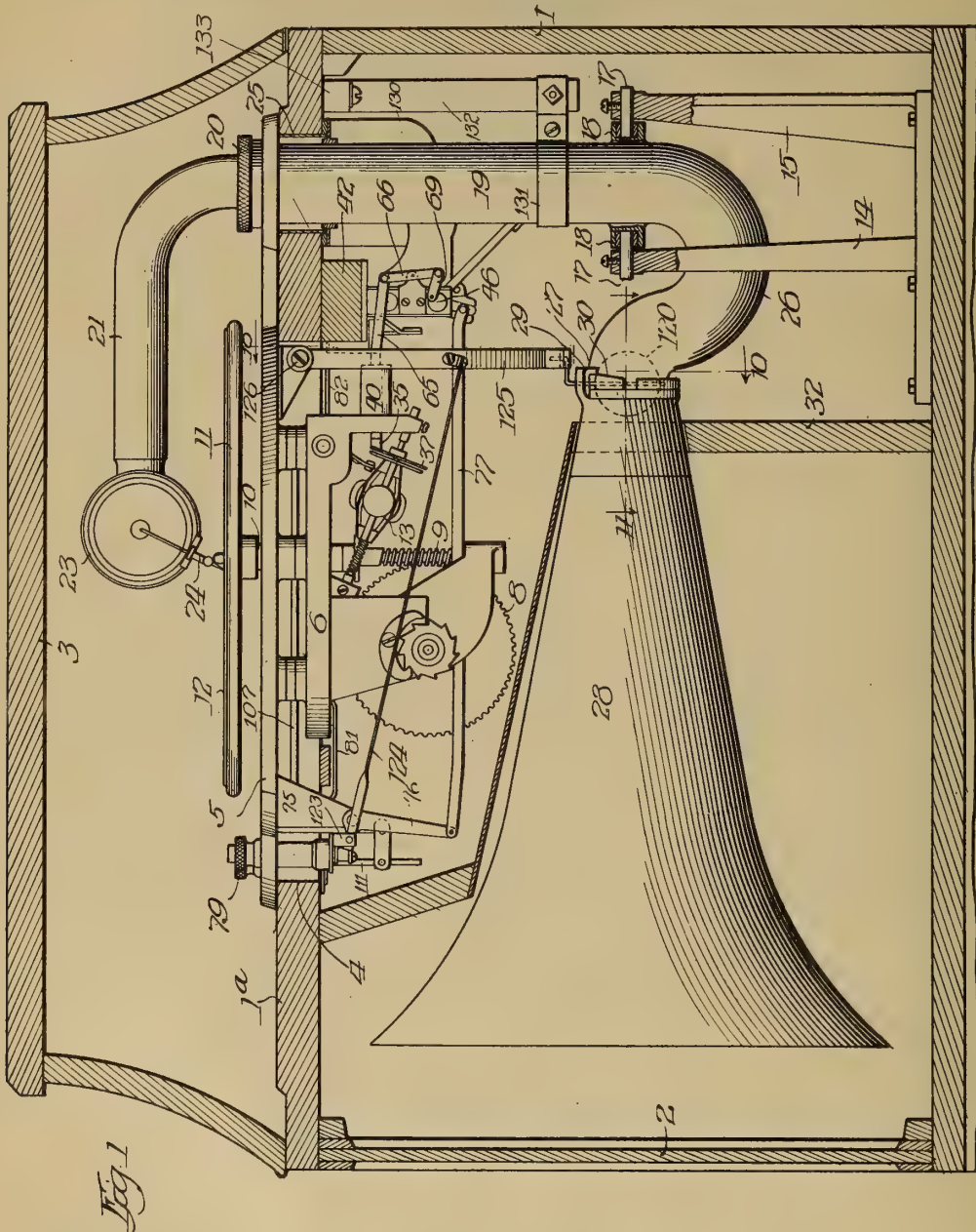
#1,224,301-----A.A.Huseby,  
Patented-May 1st, 1917.  
Filed-July 26th, 1915.

A. A. HUSEBY.  
MOTOR CONTROLLING MECHANISM FOR TALKING MACHINES.  
APPLICATION FILED JULY 26, 1915.

1,224,301.

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5 SHEETS—SHEET 1.



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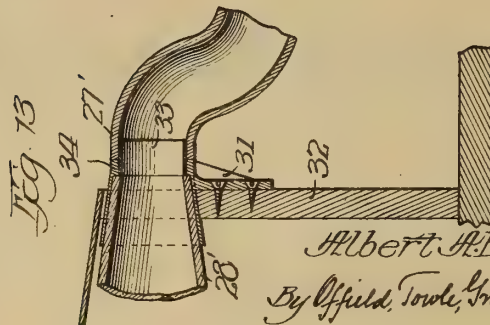
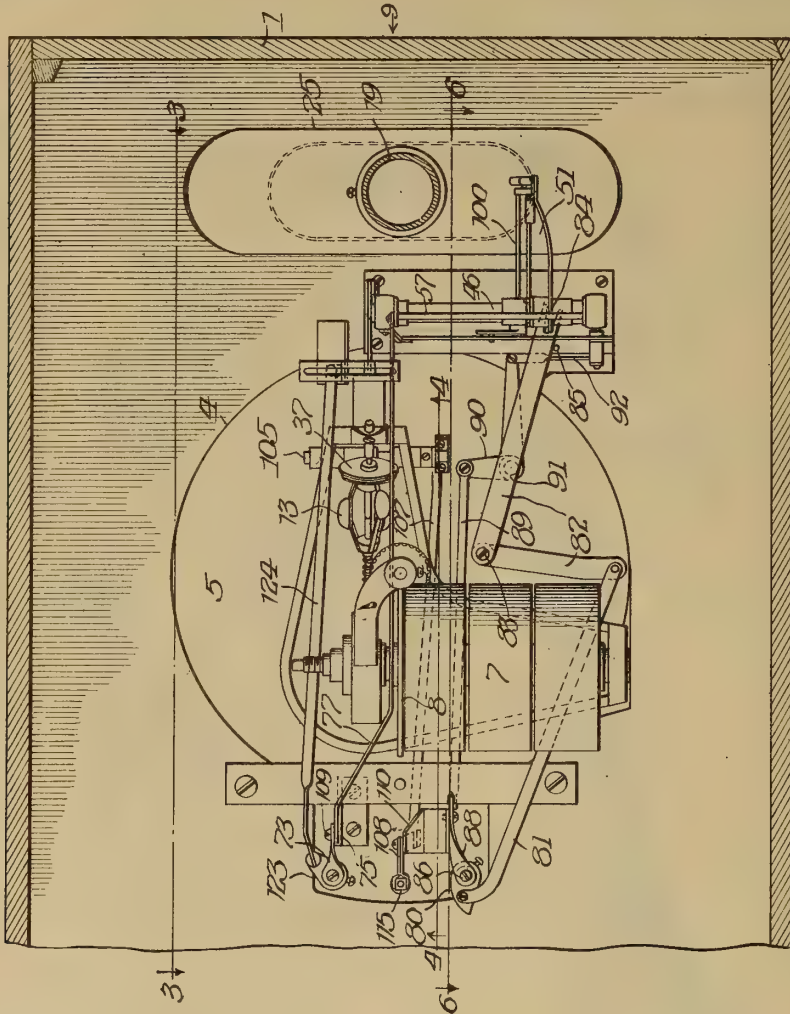


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5 SHEETS—SHEET 2.

Fig. 2



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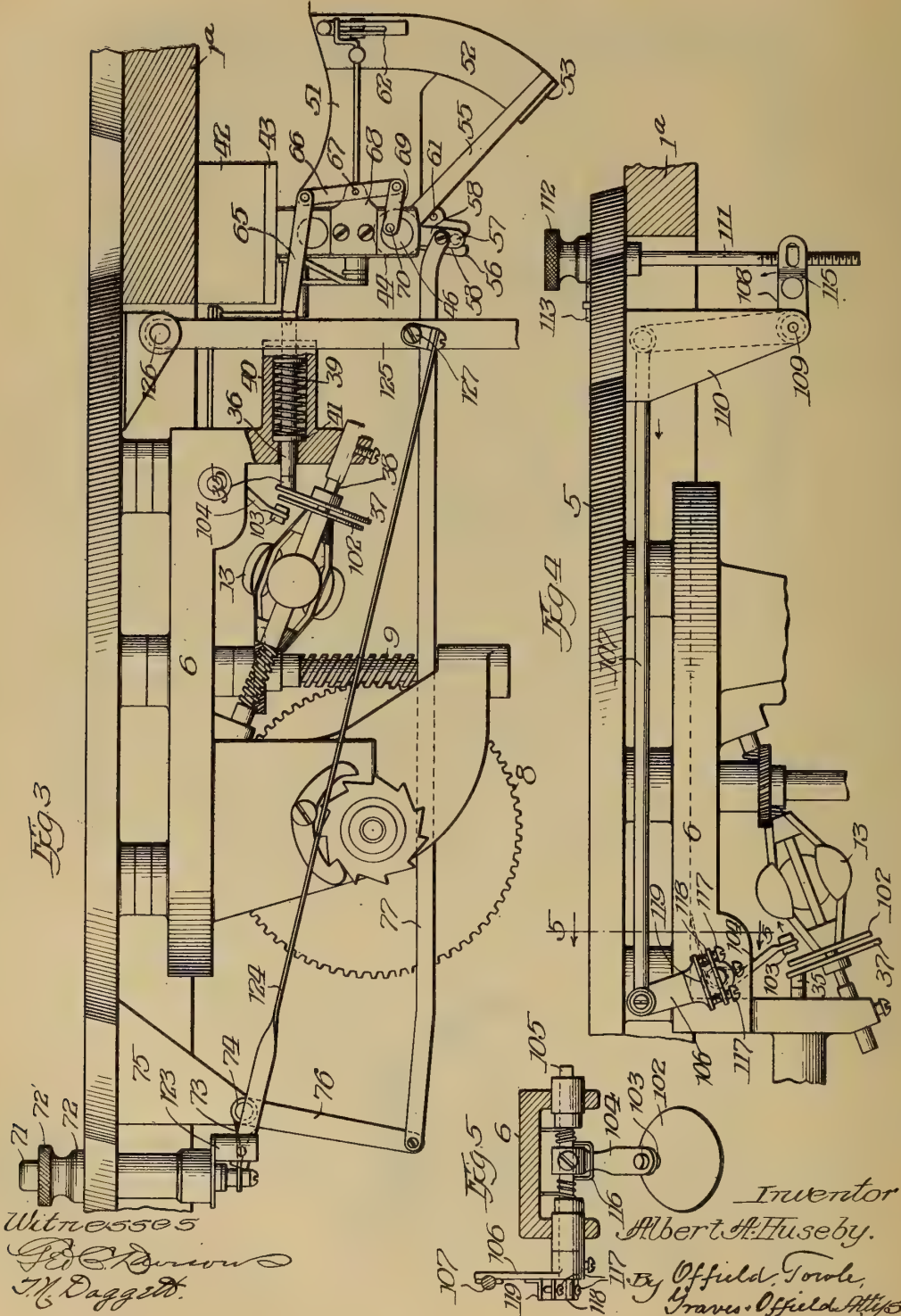


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5 SHEETS—SHEET 3.





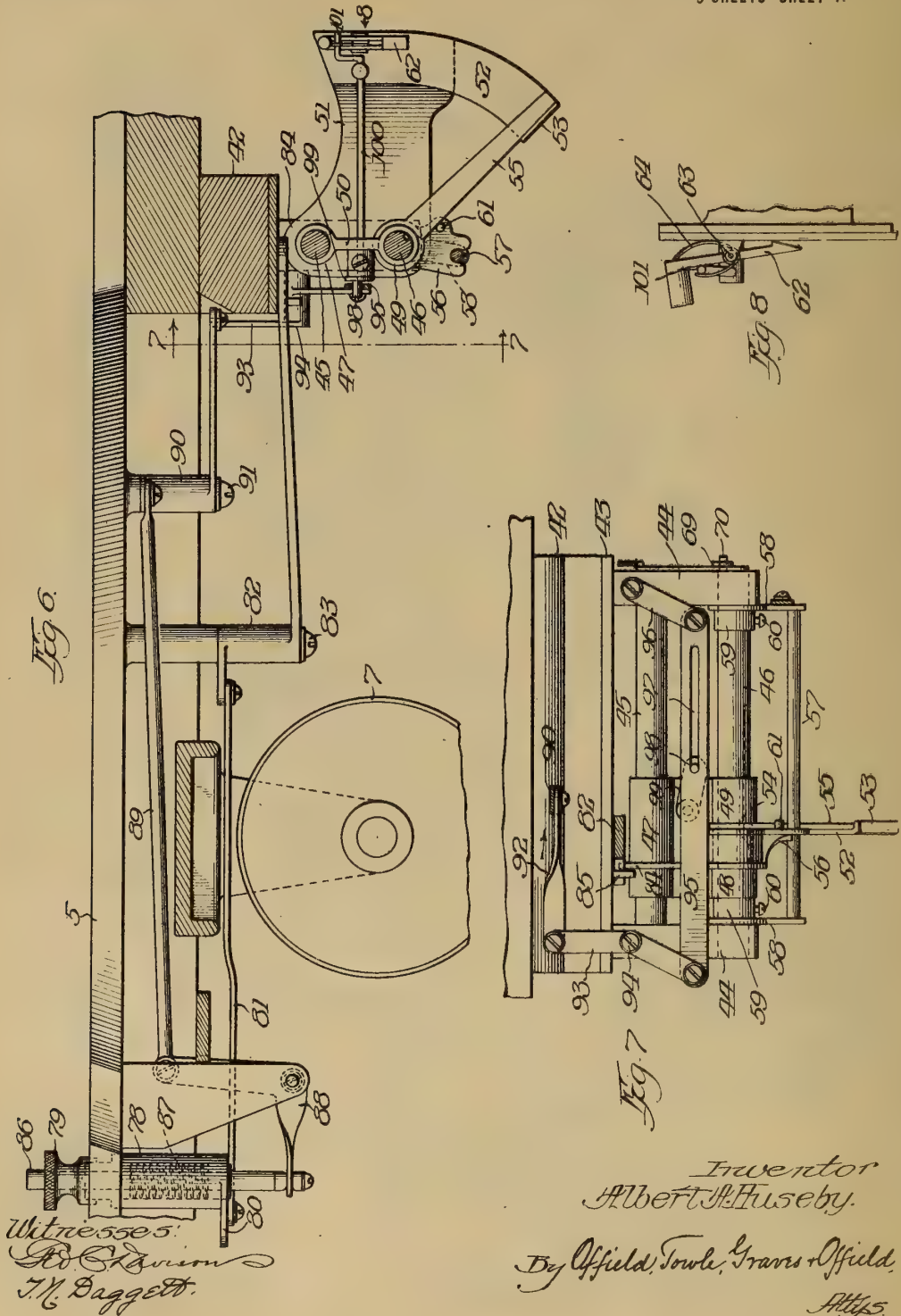


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5 SHEETS—SHEET 4.







5 SHEETS—SHEET 5.

# UNITED STATES PATENT OFFICE.

ALBERT A. HUSEBY, OF CHICAGO, ILLINOIS.

MOTOR-CONTROLLING MECHANISM FOR TALKING-MACHINES.

1,224,301.

Specification of Letters Patent. . . Patented May 1, 1917.

Application filed July 26, 1915. Serial No. 41,821.

*To all whom it may concern:*

Be it known that I, ALBERT A. HUSEBY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Motor-Controlling Mechanisms for Talking-Machines, of which the following is a specification.

This invention relates to the art of phonographs or talking machines, and the general purpose or object thereof is to provide improvements in the motor controlling mechanism of the machine. More specific objects of the invention, as will clearly appear in the following detailed description, are, to provide an improved automatic stop for arresting the rotation of the turn-table when the needle has reached the end of the record; and to provide improved manual starting and stopping devices for the motor and turn-table. Other minor objects and advantages secured by the invention will be readily understood and appreciated from a consideration of the following detailed description of the practical and approved mechanical embodiment thereof shown in the accompanying drawings, in which—

Figure 1 is a side elevation, with the box or case and certain of the supporting parts appearing in vertical section. Fig. 2 is a bottom plan view, in section, through the sound tube, and with the horn omitted for the sake of clearness. Fig. 3 is an enlarged side elevation, partly in section, of a portion of the mechanism shown in Fig. 1, as seen (in sidewise inverted position) on the line 3—3 of Fig. 2. Fig. 4 is a side elevation, partly in section, on an enlarged scale, of the speed-adjusting mechanism, as seen (in endwise inverted position) on the line 4—4 of Fig. 2. Fig. 5 is a detail view in vertical section on the line 5—5 of Fig. 4. Fig. 6 is a view, partly in side elevation and partly in section, as seen (in sidewise inverted position) on the line 6—6 of Fig. 2. Fig. 7 is a detail view taken on the line 7—7 of Fig. 6. Fig. 8 is a fragmentary detail view of the latch mechanism, looking in the direction of the arrow 8 of Fig. 6. Fig. 9 is a fragmentary rear elevational view on an enlarged scale, mainly showing the sound tube and its supporting and balancing means. Fig. 10 is a detail view in vertical section of the damper operating mechanism taken on the line 10—10 of

Fig. 1. Fig. 11 is a detail view in horizontal section of the damper and the means for attaching the horn to the sound tube, as seen on the line 11—11 of Fig. 1. Fig. 12 is a top plan view. Fig. 13 is a detail sectional view illustrating a swiveled connection of the horn and sound tube.

In the drawings 1 designates as an entirety the box or case in which the principal parts of the mechanism are housed, 2 designates the front door thereof, and 3 designates the hinged lid or cover. The top wall 1<sup>a</sup> of the case is formed with a large substantially central opening 4, over which is secured a plate 5, on the under side of which most of the mechanical parts are supported. In a suitable bracket structure 6 depending from the plate 5 is mounted a spring motor designated as an entirety by 7, this motor being of a well known construction and serving to drive, through a worm wheel 8 and worm 9, a vertical shaft 10 on the upper end of which is mounted the usual turn-table 11 that forms a support for the record disk 12. Also geared to and driven from the worm disk 8 of the motor is the usual centrifugal speed-governor designated as an entirety by 13, and referred to more particularly hereinafter.

In the rear portion of the box 1 are a pair of standards 14 and 15 (Figs. 1 and 9) rigidly connected at their upper ends by an annulus 16, and in the supporting frame structure thus formed are a pair of removable studs 17 that form supports from trunion bearings 18 that are secured to the upright section 19 of the sound tube. Into the upper end of the section 19 of the sound tube is removably secured by a milled nut 20 the upper section or arm 21 of the sound tube that overhangs the turn-table 11 and is provided on its free end with a swiveled curved extension 22 (Fig. 12) carrying the sound box 23, to which latter is connected in the usual manner the stylus or needle 24. The top wall 1<sup>a</sup> of the box is formed with a suitable opening 25 for the passage of the sound tube therethrough and accommodating the oscillating movements of the latter. The vertical section 19 of the sound tube has at its lower end a substantially semi-circular extension 26 terminating in a horizontally directed end portion 27, to which latter is secured the horn 28, said horn, as herein shown, being provided at its narrow end



with a pair of hooks 29 (Fig. 11) that engage tapered flange sections 30 on the end of the sound tube. By reason of the described method of mounting the sound tube and horn, it will be observed that the arm 21 carrying the sound box swings through the arm of a circle whose center coincides with the axis of the pivot studs 17, the swiveled connection of the sections 21 and 22 of the arm maintaining the continuous engagement of the needle with the flat record disk. The axis of the horn 28 coincides with the axis of the pivot studs 17, so that the horn does not swing bodily, but, where rigidly connected to the sound tube, merely oscillates slightly about its own axis. In Fig. 13 I have illustrated a slight modification wherein the narrow end of the horn 28' is rigidly secured to a bracket 31 carried on an upright 32, and within the end 27' of the sound tube is secured a thin sleeve or ferrule 33 that telescopes within a boss 34 of the bracket 31 and registers with the inner or narrow end of the horn.

Referring next to the starting and stopping mechanisms, the motor is normally held idle when the instrument is not in use by a brake-shoe 35 (Fig. 3) mounted on the end of a slidable rod 36 and engaging a brake-disk 37 that is fast on the governor shaft 38. The brake-shoe is normally urged into engagement with the brake-disk by a spring 39 confined within a hollow boss 40 on the supporting frame member 6 abutting at one end against the outer end of said boss and at its other end against a collar 41 on the rod 36.

Referring now to Figs. 3, 6, 7 and 8,—secured to a block 42 carried by the top wall 1<sup>a</sup> of the box is a plate 43 having a pair of parallel depending arms 44 in and between which are mounted parallel shafts 45 and 46, the shaft 45 being fixedly mounted, and the shaft 46 being rotatable. Slidably engaging the shafts 45 and 46 is a slide-block comprising a sleeve 47 (Fig. 7) on the shaft 45, a pair of shorter sleeves 48 and 49 on the shaft 46, and a connecting web 50 (Fig. 6). Integral with and extending rearwardly of the slide-block is an arm 51 carrying on its outer end a downwardly and inwardly curved extension 52 terminating in a stop 53. Splined on the shaft 46 and confined endwise between the short sleeves 48 and 49 of the slide-block is the hub 54 of a latch-bar 55, the free end of which, in its lowered position, rests against the stop 53, as shown in Figs. 6 and 7. Sleeved on the hub 54 of the bar 55 is a short depending arm 56 having a forked lower end which straddles a rod 57 that is suspended by links 58 from the shaft 46. Collars 59 secured by set screws 60 on the shaft 46 confine the links 58 in fixed position on the shaft. The arm 56 carries a lateral pin 61 that engages

the lower edge of the bar 55 and serves to swing the latter bar upwardly into engagement with a catch 62 (Fig. 8) that is pivoted at 63 on the free end of the arm 51 and is normally urged into holding engagement with the free end of bar 55 by a spring 64.

Referring to Fig. 3,—to the outer end of the rod 36, which carries the brake-shoe 35, is secured a link 65 connected to the upper end of a lever 66 that is pivoted at 67 to a bracket 68 on the arm 44, and the lower end of lever 66 is connected by a link 69 to an eccentric pin 70 on one end of the rotary shaft 46. It will thus be seen that the force of the spring 39 maintains the brake-shoe 35 in engagement with the brake-disk 37 and also, through the connections last described to shaft 46, tends to turn said shaft in a direction to swing the bar 55 to its lowermost position, shown in Figs. 3 and 6, where it is arrested by the stop 53. The brake-shoe 35 is withdrawn from the brake-disk 37 in starting the instrument by mechanism comprising the following parts. Referring to Fig. 3, 71 is a depressible pin slidably mounted in a sleeve 72 that is secured in a forward extension of the plate 5 and also passes through the central opening of the top plate 1<sup>a</sup> of the box, and the lower end of pin 71 is secured to the horizontal arm 73 of a bell crank lever pivoted at 74 to a bracket 75 on the plate 5, and the depending arm 76 of said bell crank lever is connected by a long link 77 to one of the arms 58 that carries the rod 57. It will thus be seen that when the pin 71 is depressed, the shaft 46 will be rocked by reason of the rod 57 swinging the arm 56 upwardly and the pin 61 swinging upwardly the latch-bar 55 which has a splined connection to shaft 46. This compresses spring 39 and withdraws the brake-shoe 35, and at the same time the free end of latch-bar 55 is caught and held by catch hook 62 so that the motor continues to work uninterruptedly until the catch is tripped, either manually or automatically, as hereinafter described, permitting the spring 39 to expand and apply the brake and at the same time return the brake-releasing parts above described to normal or idle position.

The latch mechanism for holding the latch-bar 55 is located across the path of movement of the vertical swinging section 19 of the sound tube, and in order that the latch-bar may be automatically released when the needle has reached the inner end of the record, I provide means for preliminarily moving the slide-block lengthwise of the shafts 45 and 46 to a position wherein the sound tube 19 will strike the latch when it has swung to the limit of its movement in playing any given record. This slide-block-setting mechanism, as best shown in Figs. 2 and 6, comprises a sleeve 78 mount-



ed in the plate 5 and extending through the top wall 1<sup>a</sup> and having on its outer end a milled nut 79 by which it may be turned, and on its lower end an arm 80, a link 81, and a bell crank lever 82 pivoted to a depending stud 83 on the plate 5, the free end of the rearwardly extending arm of bell crank 82 being forked and embracing a transverse rib 84 on the slide-block, a stop-pin 85 (Fig. 7) serving to limit the extent of idle or back-swinging movement of the forked arm of the bell crank. To effect the automatic stopping of the motor at the completion of the record through the mechanism last described, when the record disk is placed on the turn-table the operator first swings the arm 21 inwardly, bringing the needle 24 into the last or inmost coil of the record groove. He then manipulates the nut 79, thereby shifting the slide-block along the shafts 45, 46 until the upper end of the catch 62 strikes the sound tube 19. He then starts the instrument in operation by depressing the starting pin 71 which, as already stated, engages the bar 55 with the catch 62. As soon as the record is played, the sound tube 19 strikes the previously set catch and releases the latch-bar 55, thereby permitting the spring 39 to act and stop the motor through the brake 35.

Means are provided for manually arresting the motor at any desired time through a manual release of the latch-bar 55 by swinging the catch 62 to open position; this means comprises the following parts. Referring to Figs. 2, 6, 7, 8 and 12,—86 designates a pin that is slidably mounted within the sleeve 78 and is normally urged upwardly by a spring 87 within said sleeve. The lower end of the pin 86 is connected to one arm of a bell crank lever 88, the other arm of which is connected by link 89 to a second bell crank lever 90 pivoted on a stud 91 depending from the plate 5, and the other arm of bell crank lever 90 is connected by a link 92 (Fig. 7) to one arm of a vertical bell crank 93 pivoted at 94 on one of the arms 44. The depending arm of bell crank 93 is connected to one end of a bar 95 the other end of which bar is suspended from the other arm 44 by a link 96 that is parallel with the lower arm of bell crank 93, so that as the latter is swung, the bar 95 has a parallel ruler movement. The bar 95 has a longitudinal slot 97 engaged by a pin 98 on the outer end of a crank arm 99 fast on a shaft 100 that is journaled in the slide-block and its arm 51. On the outer end of shaft 100 is a crank 101 that lies across the upper portion of catch 62. When, therefore, pin 86 is depressed, catch 62 is swung to release position, permitting latch-bar 55 to drop and the motor to be arrested by the brake. The pin and slot connection 98, 97 of the crank arm 99 with the bar 95 permits

the slide-block to be manipulated as described without any interference with the manual stopping mechanism.

Referring next to the speed-regulating mechanism for securing desired tempo effects, this is best illustrated in Figs. 2, 4 and 5, wherein 102 designates a brake-disk that is connected to and movable bodily with the expanding arms of the ball governor, and 103 designates a brake-shoe carried by the lower end of an arm 104 that is keyed on a short shaft 105 journaled in a portion of the frame structure 6. Keyed on one end of shaft 105 is an arm 106 to which is connected a link 107, the other end of which is connected to the vertical arm of a bell crank lever 108 pivoted at 109 in a bracket 110 depending from the plate 5. Journaled in the plate 5, and extending through the top wall 1<sup>a</sup>, is a vertical rod 111 carrying on its upper end a thumb-nut 112 preferably provided with a pointer 113 coöperating with a dial-plate 114. The lower portion of rod 112 is threaded and engages a nut 115 that is swiveled in the horizontal arm of bell crank lever 108. By turning the thumb-nut 112, the brake-shoe 103 is adjusted to a position to give the maximum desired speed. Any slack or lost motion in the connections between the thumb-nut 112 and the brake-shoe arm 104 is taken up by a spring 116, as shown in Fig. 5. Fine adjustments to compensate for wear on the brake-shoe 103 are effected by a pair of screws 117 threaded through a plate 118 secured in one end of the shaft 105 and bearing against an abutment flange 119 on the side of the arm 106. By loosening the fastening device of the arm 106 on the shaft 105 and turning the screws 117 in reverse directions, the necessary alteration in the angular relation of the arms 106 and 104 can be readily effected, and the arm 106 then re-fastened to the shaft 105.

Describing now the tone-damper or muffler, and referring particularly to Figs. 1, 3, 10 and 11, 120 designates a damper disk that is mounted on a pivot 121 in the throat of the horn, the opposite semi-circular edge portions of the disk being adapted to close against a pair of semi-ring members 122 of felt or any other suitable material. The damper-actuating mechanism comprises the sleeve 72 which surrounds the starting pin 71, an arm 123 on the lower end of said sleeve, a long link 124, and a vertically pivoted lever 125 that is suspended from a pivot pin 126 in the top wall 1<sup>a</sup>, is connected at 127 to the link 124, and has a slotted horizontal extension 128 at its lower end (Fig. 10), through the slot of which extends a crank 129 on the spindle or pivot 121 of the damper. By turning the milled upper end 72' of the sleeve 72 more or less, the damper may be closed or opened to any desired extent to modify the volume and intensity of



the sound waves transmitted through the sound tube and horn. A damper such as that described located in the throat of the horn is much simpler and more effective as  
 5 a sound-modifying medium than the usual shutters that are located in a wall of the box or casing in front of the horn, as is the common practice.

To the vertical portion 19 of the sound  
 10 tube is secured a curved plate 130 (Fig. 9) that underlies and partially closes the oblong slot 25 through which the sound tube oscillates. This feature may, of course, be employed or omitted as desired. On the vertical  
 15 section 19 of the sound tube is secured a ring or collar 131 to which is attached a leaf spring 132, the upper end of which is confined between a pair of stationary blocks 133. This spring 132, cooperating with the curved  
 20 lower portion 26 of the sound tube, below its pivot, counterbalances the gravity effect of that portion of the sound tube above the trunnion, thus holding the sound tube substantially balanced in all positions.

From the foregoing description of an instrument embodying the various improved features which comprise the present invention, it is believed that the manner in which the several stated objects of the invention  
 25 are accomplished will be easily comprehended by those familiar with this art. The details of the several mechanisms illustrated and described, may, of course, be modified as circumstances may require or the judgment of the builder dictate, without involving  
 30 any substantial changes or sacrificing any of the benefits and advantages secured. Hence, I reserve to myself any and all such detail changes and modifications as may  
 35 fairly fall within the spirit and purview of the invention as defined in the appended claims.

I claim—

1. In a motor-controlling mechanism for  
 45 talking machines, the combination of a motor, a brake for said motor, a spring normally tending to apply said brake, a latch mechanism for holding said brake retracted disposed across the path of a movable element of the machine and adapted to be automatically unlatched by said movable element, a depressible pin, and lever and link  
 50 connections from said pin to said latch mechanism whereby the latter may be unlatched to permit the application of the brake at any desired time.

2. In a motor-controlling mechanism for talking machines, the combination of a motor, a brake for said motor, a spring normally tending to apply said brake, a latch  
 60 mechanism for holding said brake retracted disposed across the path of a movable element of the machine and adapted to be automatically unlatched by said movable element, a depressible pin, lever and link con-

nections from said pin to said latch mechanism whereby the latter may be unlatched to permit the application of the brake at any desired time, a second depressible pin, and  
 70 lever and link connections from said second pin to said latch mechanism whereby the latter may be latched to effect the retraction of the brake.

3. In a motor controlling mechanism for talking machines, the combination of a  
 75 motor, a brake for said motor, a spring normally tending to apply said brake, a pivoted catch hook, a pivoted latch bar connected to said brake, manually operable means for swinging said latch bar into engagement  
 80 with said catch hook to hold said brake retracted, and manually operable means for swinging said catch hook to release said latch bar.

4. In a motor controlling mechanism for  
 85 talking machines, the combination of a motor, a brake for said motor, a spring normally tending to apply said brake, a slide-way, a slide block on said slideway carrying a pivoted catch hook located in the path of  
 90 movement of a movable element of the machine, and a pivoted latch bar slidable laterally with said slide block and serving, when engaged with said catch hook to hold said  
 95 brake retracted.

5. In a motor controlling mechanism for talking machines, the combination of a motor, a brake for said motor, a spring normally tending to apply said brake, a slide-way, a slide block on said slideway carrying  
 100 a pivoted catch hook located in the path of movement of a movable element of the machine, a pivoted latch bar slidable laterally with said slide block and serving when engaged with said catch hook to hold said  
 105 brake retracted, manually operable means for engaging said latch bar with said catch hook, and manually operable means for shifting said slide block to set said catch hook at any predetermined position in said  
 110 path of movement.

6. In a motor controlling mechanism for talking machines, the combination of a motor, a brake for said motor, a spring normally tending to apply said brake, a slide-way, a slide block on said slideway carrying  
 115 a pivoted catch hook located in the path of movement of a movable element of the machine, a pivoted latch bar slidable laterally with said slide block and serving when engaged with said catch hook to hold said  
 120 brake retracted, manually operable means for shifting said slide block to set said catch hook at any predetermined position in said path of movement, manually operable means  
 125 for engaging said latch bar with said catch hook, and manually operable means for disengaging said latch bar from said catch hook.

7. In a motor-controlling mechanism for 130

5 talking machines, the combination of a motor, a brake for said motor, a spring normally tending to apply said brake, a slideway, a slide-block on said slideway, an arm carried by said slide-block extending at right angles to said slideway, a pivoted catch-hook on the free end of said arm located in the path of a movable element of the machine, a pivoted latch-bar connected to said brake and extending in the direction of said arm, said latch-bar at its free end adapted to engage said catch-hook and hold said brake retracted, and manually operable means for shifting said slide-block lengthwise of said slideway. 10 15

ALBERT A. HUSEBY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





DISK RECORD CABINET.

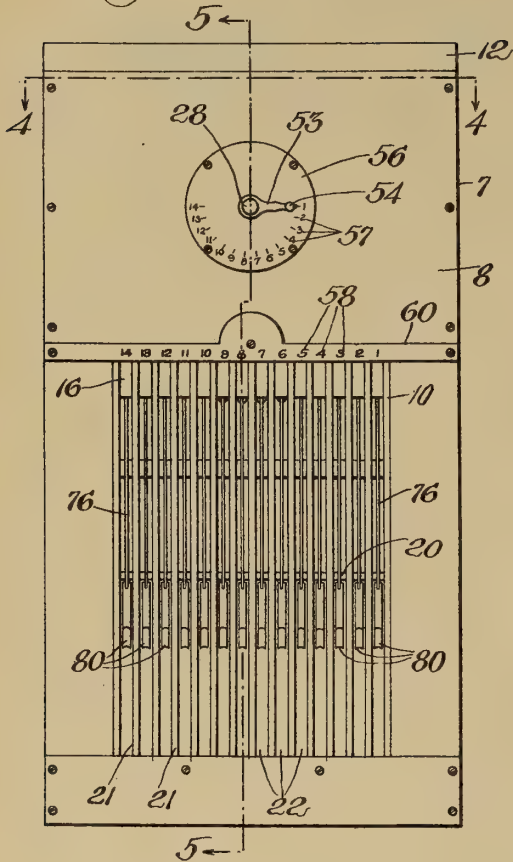
#1,224,352-----N. A. Apostolopoulos,  
Patented-May 1st, 1917.  
Filed-Feb. 11th, 1916.

N. A. APOSTOLOPOULOS.  
DISK RECORD CABINET.  
APPLICATION FILED FEB. 11, 1916.

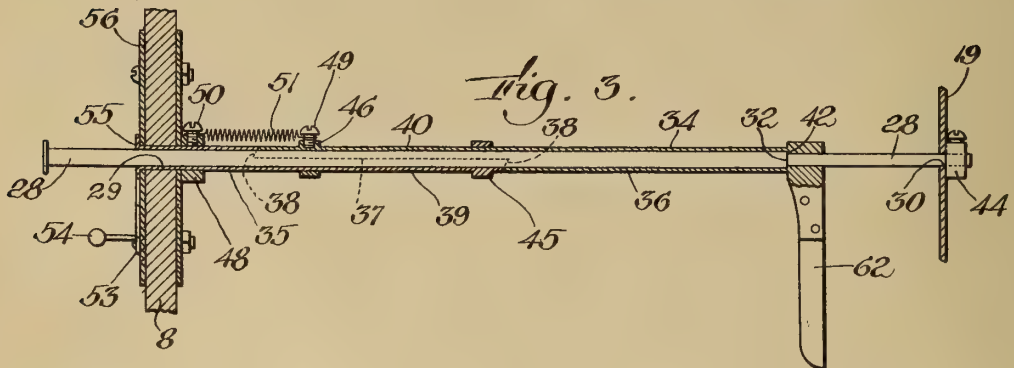
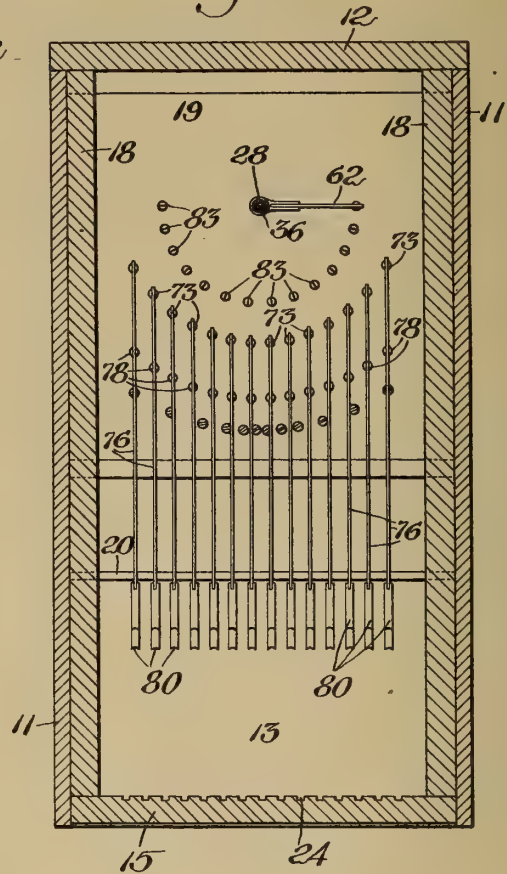
1,224,352.

Patented May 1, 1917.  
2 SHEETS—SHEET 1.

*Fig. 1.*



*Fig. 2.*



*Fig. 3.*

*Inventor:*  
Niklas A. Apostolopoulos  
By Horatio E. Bellows  
Atty.

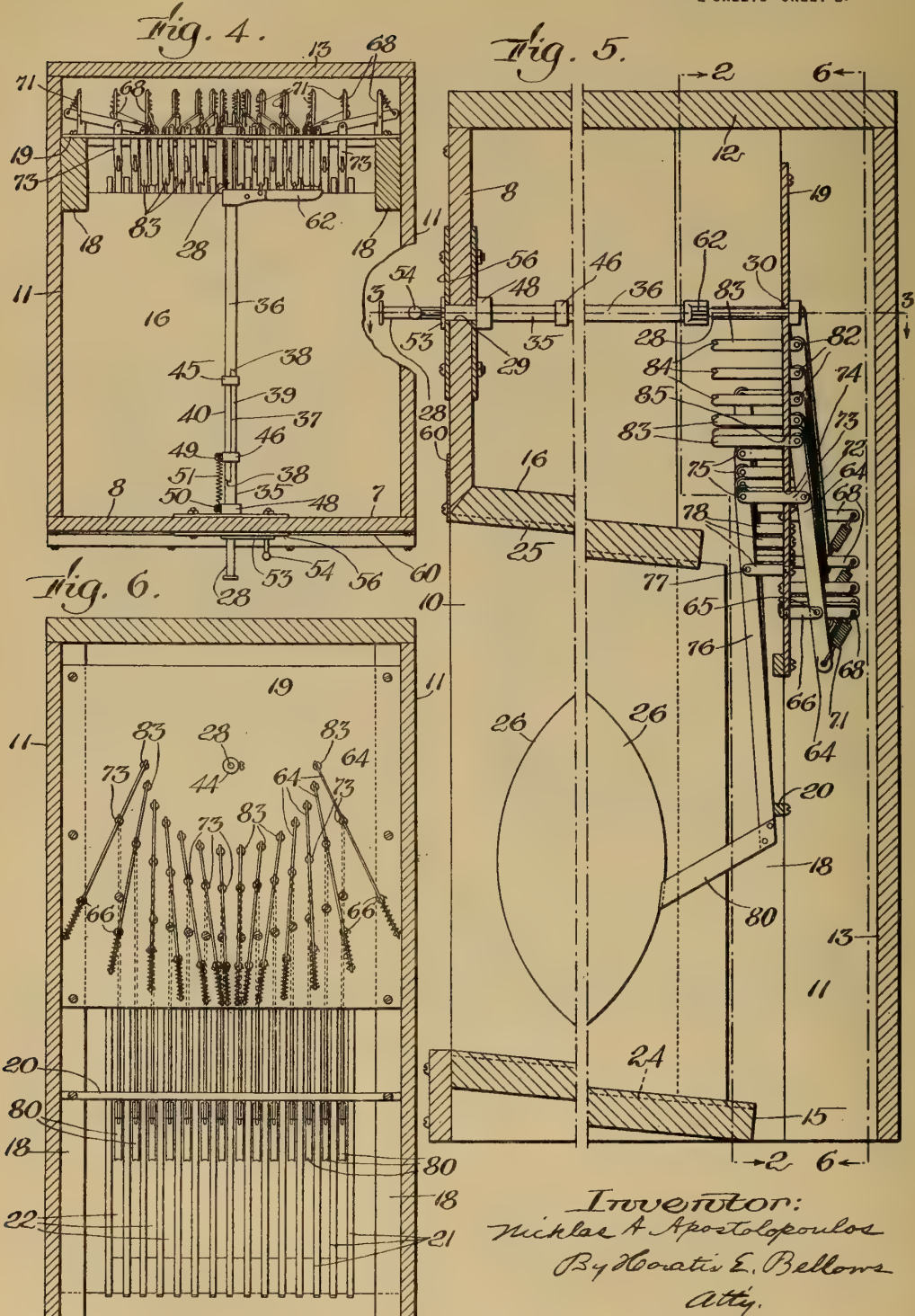




N. A. APOSTOLOPOULOS.  
DISK RECORD CABINET.  
APPLICATION FILED FEB. 11, 1916.

1,224,352.

Patented May 1, 1917.  
2 SHEETS—SHEET 2.



Inventor:  
Niklas A. Apostolopoulos  
By Horatio E. Bellows  
Atty.

# UNITED STATES PATENT OFFICE.

NICKLAS A. APOSTOLOPOULOS, OF PROVIDENCE, RHODE ISLAND.

## DISK-RECORD CABINET.

1,224,352.

Specification of Letters Patent.

Patented May 1, 1917.

Application filed February 11, 1916. Serial No. 77,586.

*To all whom it may concern:*

Be it known that I, NICKLAS A. APOSTOLOPOULOS, a subject of the King of Greece, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Disk-Record Cabinets, of which the following is a specification.

My invention relates to cabinets adapted for the accommodation of phonograph disk records.

It has heretofore been attempted to discharge the disks from their compartments in the cabinet by operating an individual lever device for each compartment; or to operatively connect a plurality of lever devices with a single actuating member, in which case complicated mechanisms operable independently of the actuator were required.

An essential object of my invention is to select and dislodge any single disk of a series by a single device operable both as an actuating member and as an indicator without auxiliary mechanism.

Another object is to expel as well as dislodge a disk from the cabinet.

A further object is to visually facilitate the selection of any particular disk, and to discharge the same in a minimum of time.

It is further sought to attain the enumerated objects by a structure substantial in character and convenient and reliable to operate.

To the above ends essentially my invention consists in such parts and combinations of parts as fall within the scope of the appended claims.

In the accompanying drawings which form a part of this specification,

Figure 1 is a front elevation of a cabinet embodying my invention,

Figs. 2 and 3, sections on lines 2—2 and 3—3 respectively of Fig. 5,

Fig. 4, a horizontal section on line 4—4 of Fig. 1,

Fig. 5, a vertical section partially broken away on line 5—5 of Fig. 1, and

Fig. 6, like section on line 6—6 of Fig. 5. Like reference characters indicate like parts throughout the views.

The casing may be of any form best adapted to house and support the operative mechanism and disks. In the form thereof herein shown the casing 7 comprises a front wall 8 with an opening 10 in its

lower half; side walls 11, top wall 12, a back wall 13 and inclined base 15, and an inclined housing piece 16 extending rearwardly and downwardly from the top of the opening 10. Near the rear wall are vertically disposed cleats 18 to which is fixed a plate or wall 19, and a stop bar 20 below the latter. In the opening 10 are fixed spaced strips 21 forming compartments 22. Between the strips the members 15 and 16 are provided with guide grooves 24 and 25 respectively to accommodate record disks 26.

Slidably and rotatably mounted in the casing is a push rod 28. This passes through openings 29 and 30 in the walls 8 and 19 respectively. Near its rear end the rod is of reduced diameter forming a shoulder 32. Rotatable on the rod is a divided sleeve 34 comprising two sections 35 and 36 formed by a longitudinal slit 37, and oppositely directed end slits 38 into two longitudinally disposed overlapping projections 39 and 40 upon their adjacent ends whereby the sections are interlocked and movable together when one section is rotated, but have movement relatively to each other longitudinally. The internal diameter of the rear end of section 36 is reduced forming a shoulder 42 adapted to abut against the shoulder 32 of the rod. Upon the rear extremity of the rod is a stop nut 44 engageable with the plate 19. Guide rings 45 and 46 fast on fingers 39 and 40 respectively loosely surround the adjacent fingers or projections. Fixed to the section 35, adjacent the front wall, is a ring 48. Screws 49 and 50 in rings 46 and 48 are connected by a retractile spring 51. Section 35 which extends through the opening 29 in the front wall has upon its end a pointer 53 carrying a knob or handle 54. This section passes also through a central opening 55 of a curved index plate 56 fixed to the face of the front wall and provided with a curved numeral index 57 corresponding consecutively with a numeral index 58 on a plate 60 fixed to the front wall above the compartments 22 and severally numerically identifying each of the latter. Fast to the rear end of the sleeve section and at right angles thereto is an arm 62 of any preferred shape or size, but in the present instance is so thin as to constitute a blade.

Through the push arm 62 is actuated selectively some single one of a series of disk delivery members, which correspond in number to the number of disk compart-



ments. Each delivery member is operated through a lever mechanism, and the description of a single mechanism will serve for all.

A lever 64 is pivoted near its lower end 5 as at 65 to a rearwardly directed post 66 on the back of plate 19. A projection 68 on the post in alinement therewith has its end connected to the lower end of the lever 64 by a retractile spring 71. Pivotally 10 connected to an intermediate portion of the lever, as at 72, is a link 73 passing through an opening 74 in the plate 19, and connected, as at 75, to the upper end of a lever 76 pivotally mounted intermediate its length, as 15 at 77, to a post 78 fixed to the front side of the plate. A forwardly and downwardly inclined shoe 80 on the lower end of the arm 76 projects into one of the compartments 22 and is adapted to contact with the 20 lower portion of the periphery of the inclosed disk 26. The upper end of lever 64 has pivotally connected thereto, as at 82, a pin 83 provided preferably with a guide notch 84 in its end. This pin extends forwardly through an opening 85 in the plate. 25 It will be noted that these pins are arranged in a curved series to which the arm 62 bears a radial relation, so that when the arm is advanced toward the series any selected pin 30 may be in its path. These pins are interspaced to correspond with the graduations of the indices upon the exterior of the cabinet. The levers 64 are radially disposed with relation to the axial line of the push 35 rod and actuator, which permits ample spacing for the vertical levers 76.

The operation of the device is as follows:

The operator manually swings the pointer 40 53 to the numeral in the index 57 which corresponds with the numeral in index 58 which identifies the disk to be discharged. This movement rotates the entire sleeve 34 and its blade 62 until the latter is in longitudinal alinement with the particular pin 45 83 connected with the lever series leading to the selected disk compartment.

The push rod 28 is next manually pushed rearwardly, which by means of its shoulder 50 32 engaging the shoulder 42, as seen in Fig. 3, carries the blade 62 into the guide notch 84 of the selected pin 83, forcing the latter rearwardly. The split or sectional character of the sleeve 34 permits this free advance of the rod, and the spring 51 returns 55 both the rod and the advanced sleeve section 36 to original position after the rod is released by the hand. The rearward movement of the pin 83 carries the lever 64 in the same direction, and its link 73 swings the arm 76 so as to completely expel, by its shoe 80, the disk 26 from its compartment. The spring 71 returns the pin and its 60 connected parts to original position when the rod 28 retreats.

It will be observed that the member 62 acts not only as a selector, but as an actuator of the mechanism connected with any pin pressed thereby, thus avoiding auxiliary mechanism or devices, and increasing the speed and facility of operation of the device. 70

I claim:—

1. In a disk record cabinet, the combination of receptacles for records, a series of vibratory members for forcibly and positively dislodging the records, a single actuator for said members, and means for selectively directing the actuator to contact with a single member. 75

2. In a disk record cabinet, the combination of receptacles for records, a series of vibratory members for forcibly and positively dislodging the records, a single actuator for said members, and manually controlled means for adjusting the actuator to contact with a single member. 80

3. In a disk record cabinet, the combination of a plurality of receptacles for records, a plurality of vibratory members for forcibly dislodging the records, a single actuator for all said members, a push rod supporting the actuator, and manually controlled means on the rod engaging the actuator for adjusting the actuator to contact 85 with a single member. 90

4. In a disk record cabinet, the combination of a plurality of receptacles for records, a plurality of vibratory members for dislodging the records, a push rod mounted in the cabinet movable toward and away from the members, and an actuator axially movable on the rod adapted to contact with a single member when the rod is moved. 95

5. In a disk record cabinet, the combination of a plurality of receptacles for records, a plurality of members for dislodging the records, a push rod movable toward and from the members, a single actuator for all of the records comprising a section on the rod, and an arm disposed at an angle to the rod and adapted to contact with a single member when the rod is advanced, and a second section on the rod adapted to interlock with the first section when the rod retreats. 100

6. In a disk record cabinet, the combination of a plurality of receptacles for records, a plurality of members for dislodging the records, a push rod movable toward and from the members, a single actuator for all of the records comprising a tubular section on the rod axially movable relatively thereto and an arm disposed at an angle to the rod and adapted to contact with a single member when the rod is advanced, and a second section loose on the rod adapted to engage the first section when the rod retreats. 105

7. In a disk record cabinet, the combination of a plurality of receptacles for rec- 110

ords, a plurality of members for dislodging the records, a push rod movable toward and from the members, a single actuator for all of the records comprising a tubular section  
 5 on the rod movable axially with relation thereto, a projection on the section, and an arm disposed at an angle with relation to the rod adapted to contact with a single member when the rod is advanced, a second  
 10 section on the rod, and a projection on the second section adapted to engage the first projection when the rod retreats.

8. In a disk record cabinet, the combination of a plurality of receptacles for records, a push rod movable toward and from  
 15 the members, a single actuator for all of the records comprising a section on the rod movable axially with relation thereto, and an arm disposed at an angle thereto and  
 20 adapted to contact with a single member when the rod is advanced, a second section on the rod and movable axially with relation thereto adapted to interlock with the first section when the rod retreats, and a  
 25 spring connecting the two sections.

9. In a disk record cabinet, the combination of a plurality of receptacles for records, a plurality of members for dislodging  
 30 the records, a push rod movable toward and from the members, a shoulder on the rod, a single actuator for all of the records comprising a tubular section longitudinally and axially movable on the rod and in-  
 35 closing the shoulder, and an arm disposed at an angle with relation to the rod, a sec-

ond tubular section rotatably mounted in the cabinet surrounding the rod, longitudinal projections on the adjacent ends of the sections adapted to interengage when a section is rotated, and yielding means for  
 40 forcing the sections toward each other.

10. In a disk record cabinet, the combination of receptacles for records, a series of levers registering with the receptacles, a  
 45 push rod, an axially movable arm on the rod, a series of pins in the path of the arm, and a series of levers supporting the pins and operatively connected with the first mentioned levers.

11. In a disk record cabinet, the combination of receptacles for records, a series of  
 50 levers registering with the receptacles, a push rod, an axially movable arm on the rod, a series of pins in the path of the rod, a series of radially disposed levers supporting  
 55 the pins, and connected at intermediate portions with the first mentioned levers.

12. In a disk record cabinet, the combination of receptacles for records, a series of  
 60 levers adjacent the receptacles, shoes on the levers extending into the receptacles, a push rod, an axially movable arm on the rod, a curved series of pins concentric with the axis of the arm, radially disposed levers  
 65 supporting the pin, and links connecting intermediate portions of the radial levers with the first mentioned levers.

In testimony whereof I have affixed my signature.

NICKLAS A. APOSTOLOPOULOS.





(Graphophone patent)

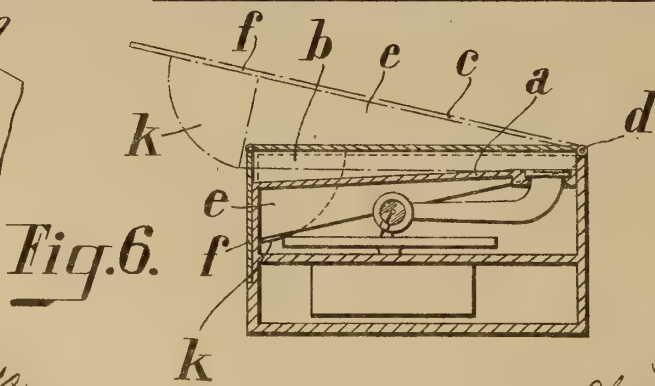
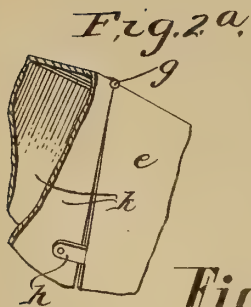
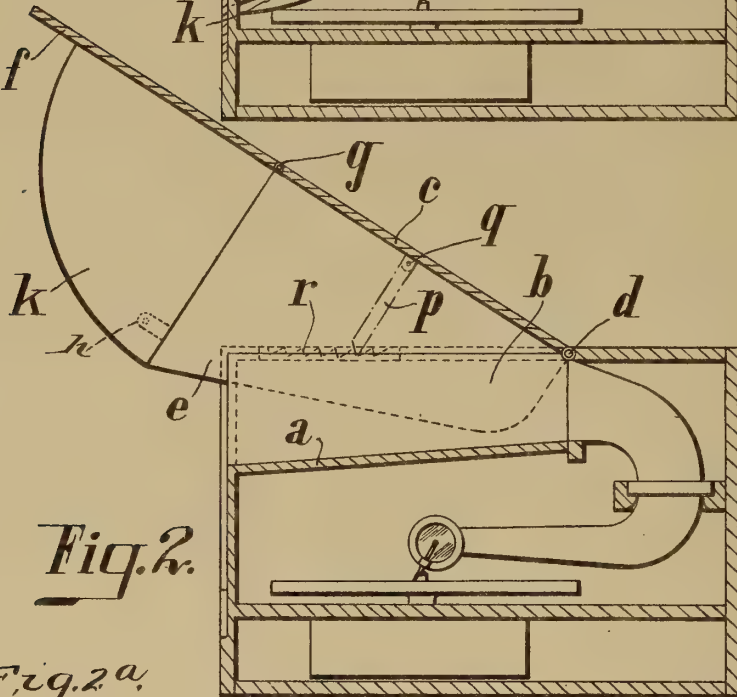
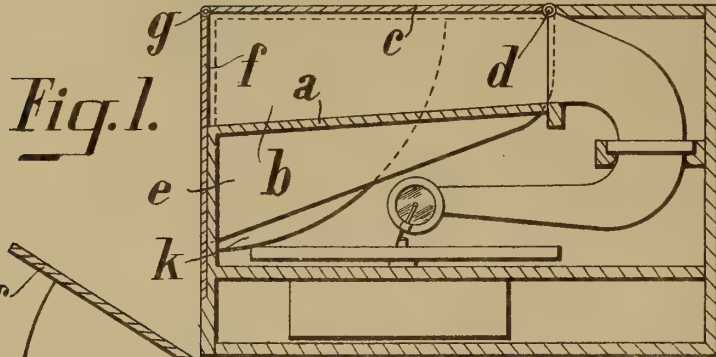
1.224.369.

PORTABLE CABINET GRAMOPHONE,  
#1,224,369-----A. Fischer,  
Patented-May 1st, 1917.  
Filed-July 31st, 1914.

A. FISCHER.  
 PORTABLE CABINET GRAMOPHONE.  
 APPLICATION FILED JULY 31, 1914.

1,224,369.

Patented May 1, 1917.  
 2 SHEETS--SHEET 1.



Witnesses.  
 E. B. Franzoni.  
 M. E. Burrell

Inventor  
 Alex. Fischer  
 By his attorneys  
 Baldwin Wright





A. FISCHER.  
 PORTABLE CABINET GRAMOPHONE.  
 APPLICATION FILED JULY 31, 1914.

1,224,369.

Patented May 1, 1917.  
 2 SHEETS—SHEET 2.

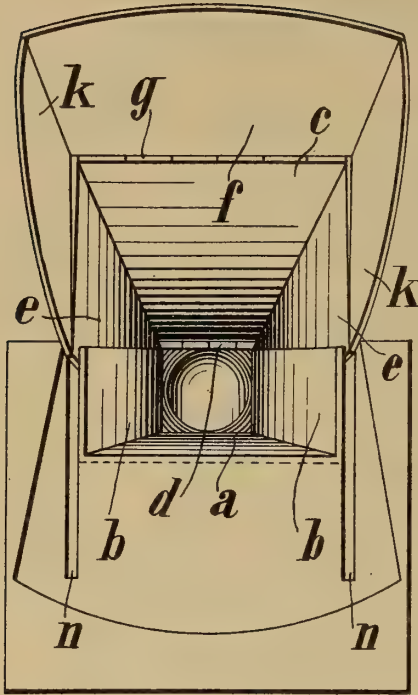


Fig. 3.

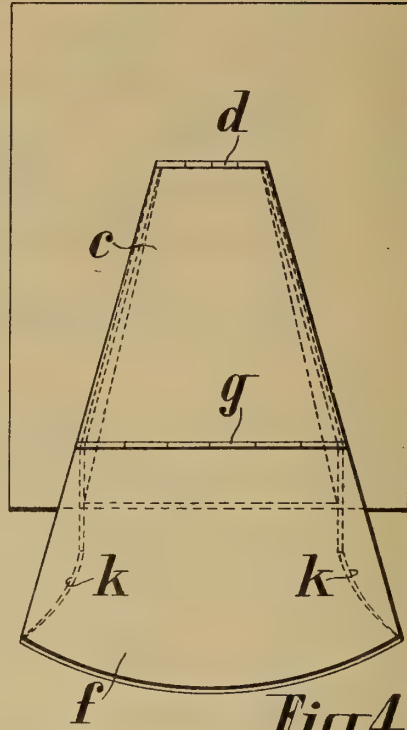


Fig. 4.

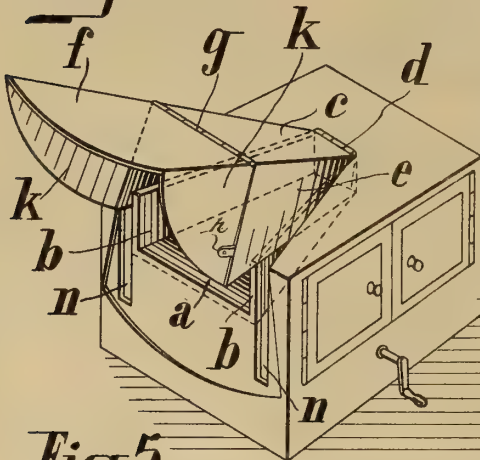


Fig. 5.

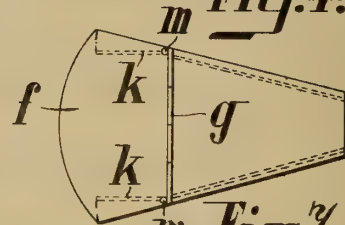


Fig. 6.



Fig. 7.

Witnesses:  
 E. B. Franzoni.  
 W. E. Burrell

Inventor,  
 Alex. Fischer  
 By his attorneys  
 Palmer Wright

# UNITED STATES PATENT OFFICE.

ALEX FISCHER, OF KENSINGTON, LONDON, ENGLAND.

PORTABLE CABINET-GRAMOPHONE.

1,224,369.

Specification of Letters Patent.

Patented May 1, 1917.

Application filed July 31, 1914. Serial No. 854,309.

*To all whom it may concern:*

Be it known that I, ALEX FISCHER, a subject of the King of England, residing at 41 Gratton road, Kensington, London, England, have invented certain new and useful Improvements in Portable Cabinet-Gramophones; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to portable cabinet gramophones and refers more particularly to an improved amplifying device for use with instruments of that description, which amplifying device is of the type which is so constructed as to enable it to be collapsed into a small compass so that the machine is easily portable since the amplifier can be folded into a small space when not in use while when the amplifier is in the playing position it is of relatively large size thus giving the reproduction a full and clear tone instead of the small muffled and pinched tone usually observed with small cabinet machines.

The present invention refers to an improved construction of amplifier of the before mentioned description comprising a tapering board provided with two side walls and another tapering board hinged with respect to the first board and also provided with two side walls adapted when the amplifier is opened or collapsed to slide with respect to the first mentioned side walls, with or without a hinged extension flap at the end of one of the main boards, such flap being preferably provided with a fixed or pivotally attached secondary flap or flaps.

In the general way of carrying out my invention I provide a small case at the lower portion of which is located the motor, in the ordinary way. The sound box, and the tone arm, are carried by suitable means in the correct position and the sound conduit is carried toward the back of the cabinet and opens suitably into the amplifying device, which forms the principal feature of the present invention. This device comprises a lower preferably fixed portion which is tapered and where fixed may be arranged horizontally or at any desired angle this lower portion being provided with two upwardly extending side walls. Mounted in hinged relation to this first portion is the

upper portion which is also tapered and which is provided with downwardly extending side portions or walls adapted to slide with respect to the fixed portion previously referred to. The upper portion of the device may have pivotally, slidably or otherwise attached thereto a secondary flap or flaps which may be turned into any suitable position according to requirements.

In one particular way of constructing a portable cabinet machine according to my invention, I arrange the motor and working parts as previously described and in such a way that the sound conduit is continued into an elbow or the like containing by preference a reflector adapted to reflect the sound waves into the amplifier. This amplifier consists of (1) a lower fixed inwardly tapering or outwardly flaring shelf or board located above the tone arm, having two fixed vertical walls and (2) a movable upper part or cover of suitable shape which is hinged and comes above the vertical walls and is provided with downwardly extending fixed flaps or walls which are somewhat triangular in shape and are parallel with the vertical walls previously mentioned.

The portion of the cover carrying the downwardly extending walls is cut out in tapering form and hinged at the back in such a way that by turning it upon the hinges the amplifier is opened more or less while retaining its rectangular form in cross section, the side walls fitting closely by sliding with respect to one another. In place of the tapering portion of the cover turning up, the cover itself, that is the whole top of the cabinet may turn up, the hinge and the downwardly extending walls being suitably located for this purpose.

At the front edges of the cover I provide a hinged flap which may form a portion of the front of the cabinet when closed, forming the door of the cabinet or it may lie against the same. The hinged flap may be provided with secondary hinged or sliding flaps which may be turned into position to increase or modify the sound. Suitable means are provided for holding the parts of the amplifier and the flaps in various positions.

And in order that my said invention may be better understood I will now proceed to describe the same with reference to the drawing accompanying this specification



which shows various methods of constructing the portable cabinet gramophone, according to my invention.

Figure 1 is a sectional side elevation of the machine with the parts in the closed position;

Fig. 2 is a similar view to Fig. 1 with the parts in the open position;

Fig. 2<sup>a</sup> is a detail view in perspective showing how the flap *f* is held in an elevated position when opened.

Fig. 3 is a front elevation of Fig. 2.

Fig. 4 is a plan of Fig. 3.

Fig. 5 is a perspective view of the machine on a smaller scale.

Fig. 6 is a similar view to Fig. 1, of a modified form of the machine.

Fig. 7 shows plan of a detail;

Fig. 8 shows another detail.

The same letters of reference are employed to denote the same parts in all the views.

Referring to the forms of the device shown in Figs. 1 to 5 the amplifier comprises a lower fixed inwardly tapering outwardly flaring board *a*. This bottom board *a* is furnished with two upwardly extending side walls *b*, *b*. *c* is an upper tapering or flaring board hinged at *d* to the top of the cabinet and provided with downwardly extending side walls *e* at such distances apart as to be adapted to slide on the outside of the upwardly extending side walls *b*. *f* is an extension flap which is hinged at *g* to the forward end of the board *c*. This flap *f* is so arranged that it can be turned down so as to come in front of the machine as shown at Fig. 1, or so that it can be turned up and retained in the upward position as shown in Figs. 2 and 2<sup>a</sup> by means of fastenings or catches such as indicated at *h* Fig. 2. *k* *k* are side flaps connected to the extension flap *f*. The flaps *k* spring inward slightly so that when the extension flap *f* is raised as indicated in Fig. 2, the inner edges of the flaps *k* will bear against the edges of the walls *e* or the catches *h* will bear against the edges of said walls *e* as indicated in Fig. 2<sup>a</sup>.

This arrangement may be effected in various ways, for instance each of the flaps may be mounted upon a rotatable pivot as shown at *m*, Fig. 7, so that these side flaps may be turned into a vertical plane at right angles with respect to the hinge *d*, as shown at Fig. 7, when it is desired to turn down the extension flap *f*, in which case vertical slots *n*, *n* are provided at the front of the cabinet through which the said side flaps *k* can pass when the amplifier is collapsed. It will be seen that when the flaps *k* are turned into the position shown at Fig. 7 upon being turned back they clear the edges of the side walls *e*.

In other cases the side flaps *k* may be rigidly fixed to the side edges of the extension

flap *f*, in which case the slots *n* must be of somewhat triangular shape, that is made wider at the bottom than at the top, in order to enable the side flaps to pass into the cabinet when the amplifier is collapsed.

Any suitable means may be provided for holding the amplifier in the open position. This may for instance consist of a rod *p* hinged at *q* to the top board *c*, the other end of the rod *p* being adapted to engage in any one of a number of teeth upon a rack *r* provided at the side as seen clearly in Fig. 2. One of these rods *p* may be provided on each side. The ordinary elbow communicates with the back of the amplifier and with the tone arm and sound box in the customary manner, and the machine is furnished with all the other usual parts incidental to a gramophone.

Referring to the modified form of the machine shown at Fig. 6, in this case the elbow in connection with the tone arm is dispensed with and the aperture of the tone arm comes directly beneath the top board *c* of the amplifier, the hinge *d* of which in this case is arranged near the top edge of the cabinet.

The top of the cabinet may be raised as a whole, in which event the downwardly extending side walls *e* are so located as to give the desired tapering passage, or in other cases a portion of the top of the cabinet may be cut out in tapering form and hinged to form the top board *c* of the amplifier and have the downwardly extending side walls *e* attached along the side edges thereof.

The form of the machine shown at Fig. 6 is more compact than that illustrated at Figs. 1 to 5, and is suitable for a cheap class of machines.

The front extension flap *f* is in this case preferably not of tapering form but rectangular as shown in the diagrammatic plan at Fig. 8.

The rectangular extension flap may also be used with other forms of the machines where desired.

A door or doors may be provided in any suitable position for enabling access to be obtained to the turn table and sound box.

In general the construction may be varied to suit requirements according to the instrument to which the invention is to be adapted.

What I claim as my invention and desire to secure by Letters Patent of the United States of America is:—

1. In a talking machine, an amplifier comprising an outwardly flaring board provided with side walls, and another outwardly flaring board hinged with respect to the first-mentioned board and having side walls which lap the side walls of the board first mentioned and have a sliding relation thereto.



2. In a talking machine, an amplifier comprising an outwardly flaring bottom board provided with upwardly extending side walls and another outwardly flaring board arranged above the bottom board and hinged with respect thereto, said upper board being provided with side walls which lap the side walls of the bottom board and have a sliding relation thereto.

3. In a talking machine, an amplifier comprising an outwardly flaring board provided with side walls, another outwardly flaring board hinged with respect to the first-mentioned board and having side walls which lap the side walls of the board first mentioned and have a sliding relation thereto, and a flap hinged to the outer end of said hinged board.

4. In a talking machine, an amplifier comprising an outwardly flaring bottom board provided with upwardly extending side walls, another outwardly flaring board above said bottom board hinged with respect thereto and having side walls which lap the side walls of the board first mentioned and have a sliding relation thereto and a flap hinged to the outer end of said hinged board and provided with flaps having a parallel relation with the walls of said hinged board.

5. In a talking machine, a cabinet having vertically arranged slots and an amplifier comprising an outwardly flaring board provided with side walls and another outwardly flaring board hinged with respect to the first-mentioned board and having side walls which enter the slots in the cabinet.

6. In a talking machine a cabinet provided with vertically arranged slots and an amplifier comprising an outwardly flaring board provided with side walls, another outwardly flaring board hinged with respect to the first-mentioned board and having side walls which enter the slots of the cabinet, and a flap hinged to said hinged board and having side walls which also enter the slots of the cabinet.

7. In a talking machine a cabinet provided with an amplifier comprising a chamber open at the top and at the front and having a bottom board, a cover for said chamber hinged to the cabinet and having downwardly extending side walls which lap the side walls of the amplifying chamber, and a flap hinged to the outer end of said cover and adapted to fold over the front end of the amplifying chamber and close it.

8. In a talking machine, a cabinet provided with an amplifying chamber comprising a bottom board, a cover hinged to the cabinet and having downwardly extending side walls, and a flap hinged to the outer end of the cover and adapted to close the front end of the amplifying chamber and side flaps carried by said hinged flap and having a parallel relation to the side walls of said cover.

In testimony whereof, I affix my signature in presence of two witnesses.

ALEX FISCHER.

Witnesses:

A. E. VIDOL,

L. SIMMONDS.



MOTOR CONTROLLING MECHANISM  
FOR TALKING MACHINES,  
#1,224,547-----A. A. Huseby,  
Patented- May 1st, 1917.  
Filed-July 31st, 1916.



A. A. HUSEBY.  
MOTOR CONTROLLING MECHANISM FOR TALKING MACHINES.  
APPLICATION FILED JULY 31, 1916.

1,224,547.

Patented May 1, 1917.  
3 SHEETS—SHEET 1.

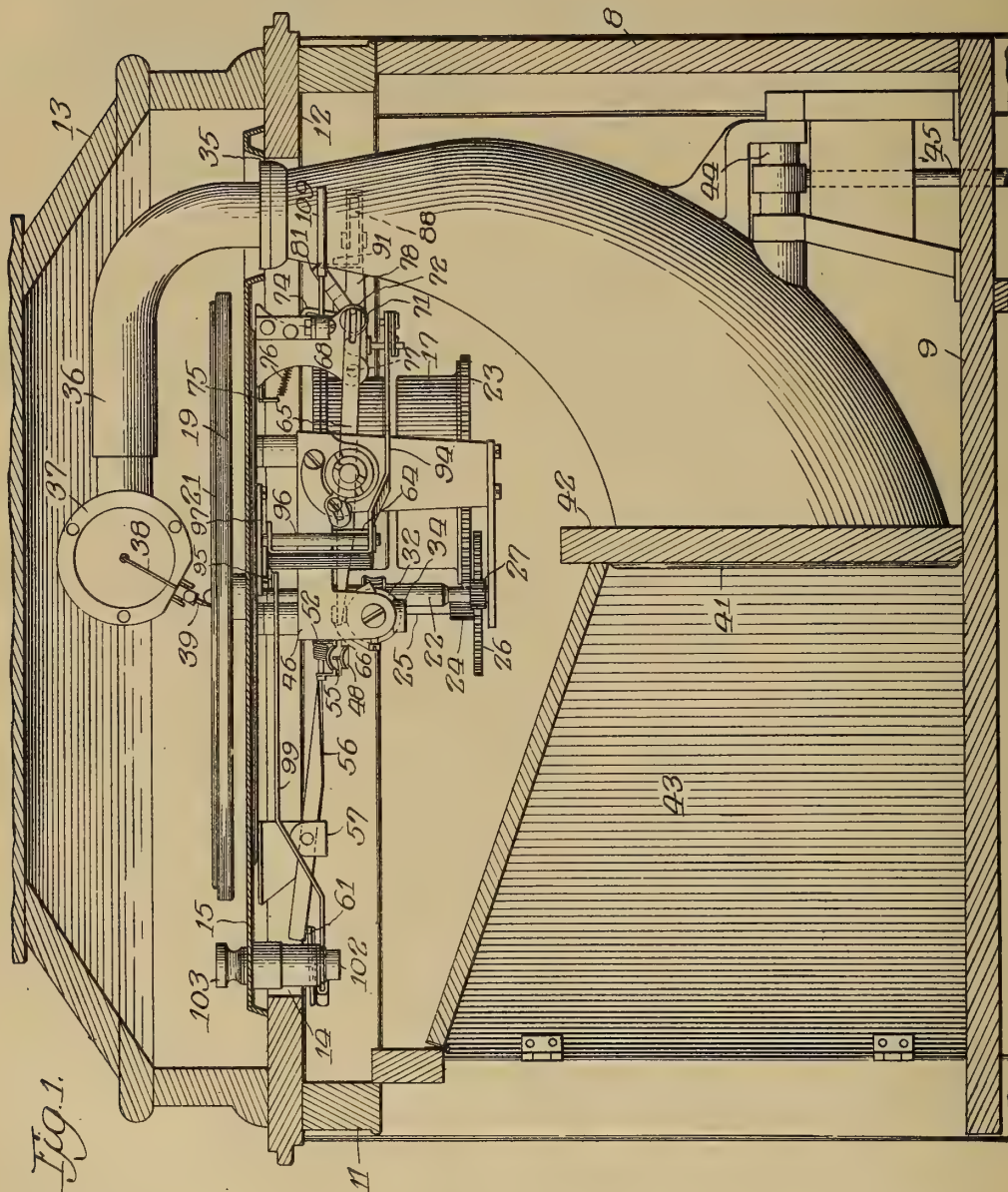


Fig. 1.

Witnesses:  
Jed C. Quinn  
C. H. Rosner.

Inventor  
Albert A. Huseby  
By Pond & Wilson  
Attys



A. A. HUSEBY.  
 MOTOR CONTROLLING MECHANISM FOR TALKING MACHINES.  
 APPLICATION FILED JULY 31, 1916.

1,224,547.

Patented May 1, 1917.  
 3 SHEETS—SHEET 2.

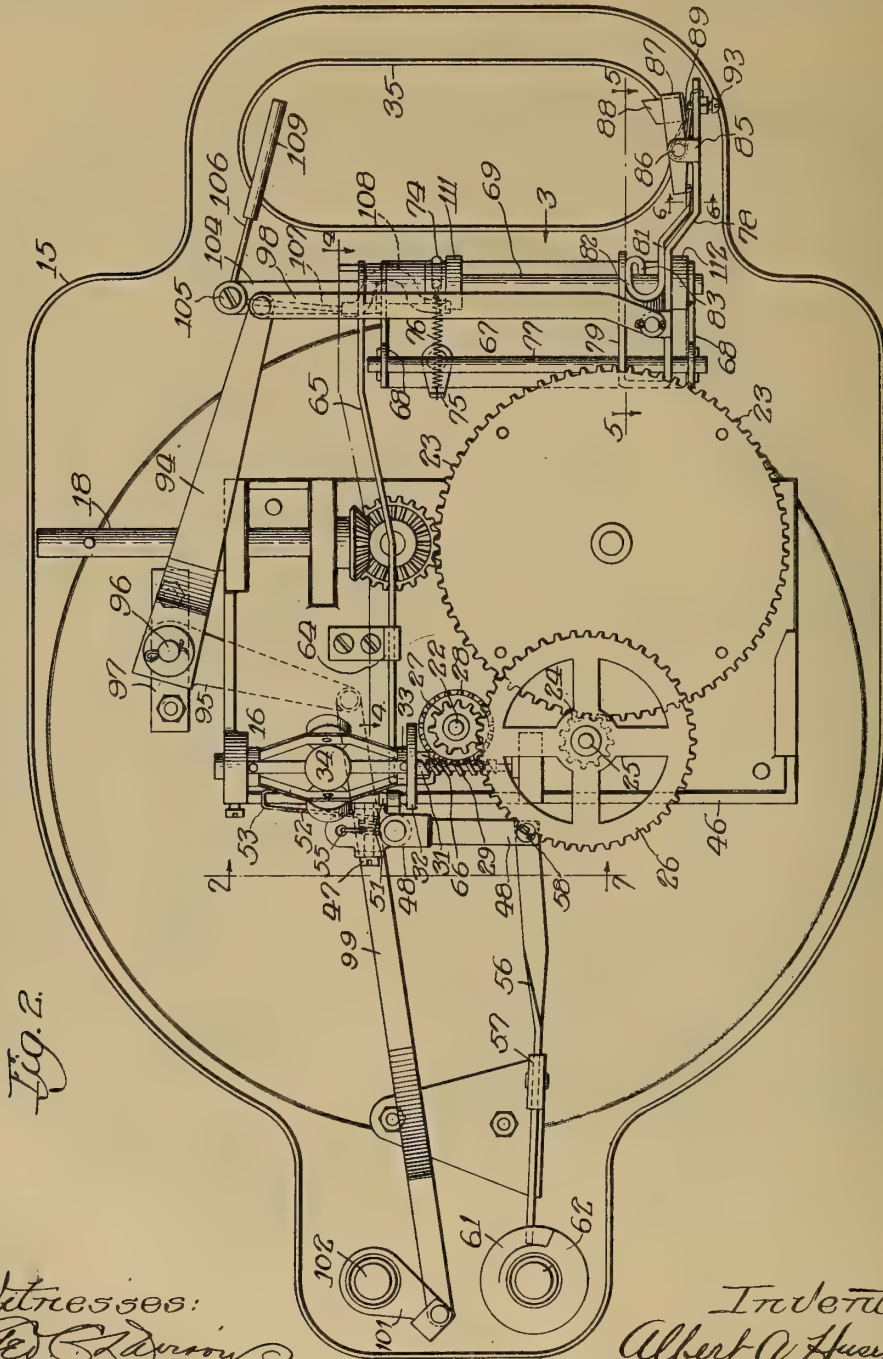


Fig. 2.

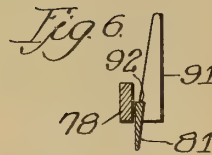
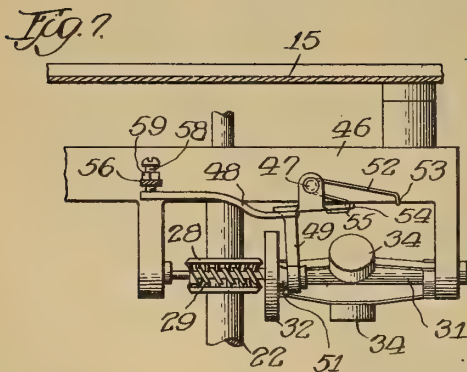
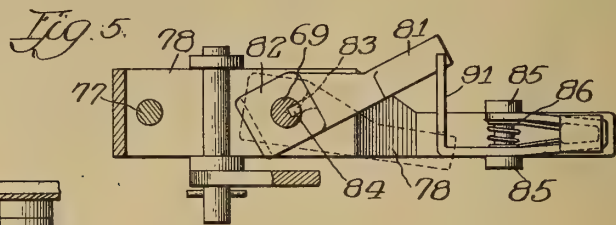
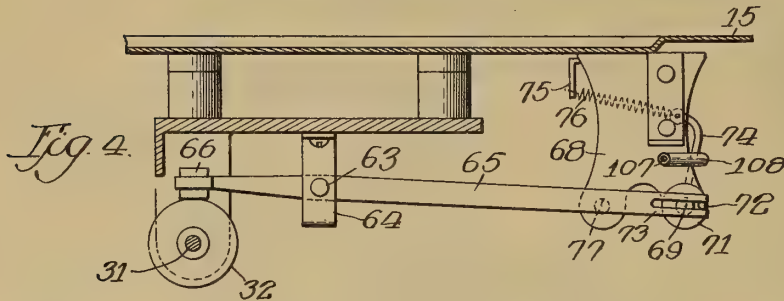
Witnesses:  
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Inventor:  
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 By *Pond & Wilson* Attys.





1,224,547.



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# UNITED STATES PATENT OFFICE.

ALBERT A. HUSEBY, OF CHICAGO, ILLINOIS.

MOTOR-CONTROLLING MECHANISM FOR TALKING-MACHINES.

1,224,547.

Specification of Letters Patent.

Patented May 1, 1917.

Application filed July 31, 1916. Serial No. 112,254.

*To all whom it may concern:*

Be it known that I, ALBERT A. HUSEBY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Motor-Controlling Mechanisms for Talking-Machines, of which the following is a specification.

This invention relates in general to phonographs or talking machines, and has more particular reference to the mechanism for controlling the motor whereby the speed of the motor may be regulated to vary the tone of the machine and whereby the motor may be automatically started and stopped by the movement of a movable element of the machine, preferably the tone arm, which travels across the face of the disk record.

One of the primary objects of this invention is to provide an improved brake-operating and controlling mechanism by means of which the brake may be applied to stop the motor and withdrawn to permit the motor to operate, the mechanism being designed to retract the brake upon movement of the tone arm to starting position and to automatically apply the brake when the tone arm reaches the end of the record groove, this mechanism being adapted for manual adjustment so that the point at which the brake will be applied may be regulated to a fine degree of nicety to accommodate the machine to various records in which the record groove terminates at different distances from the centers of the record disks.

Another object of my invention is to provide a simple and effective mechanism for regulating and controlling the motor speed, which mechanism can be adjusted and finely regulated to produce the desired motor speed by the simple manipulation of a rotatable button or knob located in a convenient and readily accessible position on the machine.

Other objects and many of the inherent advantages of this invention will be readily appreciated as the same is more fully understood by reference to the following description when considered in connection with the accompanying drawings. Referring to the drawings,—

Figure 1 is a vertical sectional view through the upper portion of a talking machine embodying my invention;

Fig. 2 is a bottom view looking upwardly

toward the plate mounted upon the upper wall of the cabinet shown in Fig. 1 and showing the motor and other mechanisms carried by the plate;

Fig. 3 is a fragmentary view looking toward the left in Fig. 2;

Fig. 4 is a sectional view on the line 4—4 of Fig. 2;

Fig. 5 is a sectional view on the line 5—5 of Fig. 2;

Fig. 6 is a detail sectional view on the line 6—6 of Fig. 2; and

Fig. 7 is a fragmentary sectional view on the line line 7—7 of Fig. 2.

From an inspection of Fig. 1 it will be observed that the cabinet, or case, in which the principal parts of the mechanism are housed comprises the rear wall 8, the bottom wall 9, the front wall 11, the top wall 12 and the hinged lid or cover 13. The top wall 12 of the cabinet is formed with a large substantially central opening 14 over which is secured a plate 15, on the underside of which most of the mechanical parts are supported.

In a suitable bracket structure comprising the plate 16 provided with a number of downwardly extending portions is mounted a spring motor, designated generally by 17, which may be of any well known or preferred construction, adapted to be wound up in the usual manner by a crank (not shown) attached to the outer end of the winding shaft 18 which is suitably geared to the motor barrel. The turntable 19 upon which the record disk 21 is positioned in the usual manner is supported above the plate 15 upon the upper end of a shaft 22 which is driven from the main driving gear 23 of the motor through the intermediary of a pinion 24 fixed on the shaft 25 and meshing with the gear 23 and a gear 26 also fixed on the shaft 25, and meshing with a pinion 27 fixed on the shaft 22. A speed governor of the usual centrifugal ball construction is driven from the shaft 22 through a worm wheel 28 on this shaft meshing with a worm 29 on the main shaft 31 of the governor. A rotatable element 32 in the form of a disk of substantial thickness is secured to the head 33 of the governor so as to move longitudinally on the shaft 31 upwardly, viewing Fig. 2, and to the right, viewing Fig. 7, under the centrifugal action of the fly balls 34 as the speed of the motor is accelerated.

The rear end of the plate is provided with



an elongated opening 35 through which projects the vertical portion of the sound tube which, at its upper end, is extended horizontally to provide the tone arm 36 carrying at its outer end the usual sound box 37 equipped with the vibratory lever 38 and the stylus 39 which engages with the record groove of the record 21. The lower end of the sound tube is turned forwardly and its mouth 41 is adapted to oscillate in an opening in a stationary wall 42 through which it projects, the sound being discharged into an amplifier 43, the particular construction of which is immaterial so far as the present invention is concerned. The sound tube is supported so as to oscillate about the axis of the mouth 41 upon a suitable scale bearing designated generally by 44 at the rear of the sound tube, a counterweight (not shown) attached to the lower end of a hanger rod 45 being employed to maintain the sound tube in substantially upright position. The tube, however, is permitted to oscillate upon the bearing 44 back and forth in the elongated opening 35 through the plate 15, so that the tone arm may travel from the periphery of the record disk substantially to the center thereof, as is customary in reproducing the record.

The parts thus far described are typical of one known type of machine, and it is believed that a detailed description of these various elements is unnecessary herein as they form the subject matter of other applications in which the details are fully elaborated.

For the purpose of controlling the speed of the motor and thereby regulating the tones of the machine when in operation I have provided mechanism which will now be described, particular attention being directed to Figs. 1, 2 and 7 of the drawings. Upon the side-piece 46 of the bracket structure in which the motor and governor are carried I have pivotally mounted upon a fixed pin or stub pintle 47 a lever, designated generally by 48. In proximity to its pivot this lever is provided with a rigid downwardly extending arm 49 provided near its extremity with a friction piece 51 formed of felt or other suitable material positioned contiguous or in proximity to one face of the rotatable element 32, so that as this element is drawn toward the right, viewing Fig. 7, by the action of the centrifugal fly balls of the governor it contacts with this friction piece whereby the speed of rotation is limited. The friction piece is normally urged toward the disk 32 by a spring 52 coiled about the pin 47, one end of the spring being hooked beneath the side-piece 46, as indicated by 53, and the other end being engaged with the short arm 54 of the lever 48, as indicated at 55, the tendency of the spring being to urge the lever in a clockwise direction about its

pivot pin 47, viewing Fig. 7, to thereby yieldingly force the friction piece 51 toward the friction disk 32.

For the purpose of limiting the movement of the friction piece toward the disk I have provided a lever 56 fulcrumed in a bracket piece 57 attached to the lower face of the plate 15, the rear end of this lever being disposed directly above the extremity of the long arm of lever 48 so that upward movement of this arm is limited by the lever 56. For purposes of adjustment the lever 56 is provided with an abutment screw 58 which may be adjusted to the requisite position when the machine is assembled and locked in this position by a locking nut 59. The forward end of the lever 56 overlies a circular cam 61 carried by an upright post 62 which is rotatably mounted in the plate 15 and is equipped at its upper end with a knurled knob (not shown), by means of which the post and its cam may be manually rotated by the operator to thereby adjust the lever 56 upon its fulcrum and, through the intermediary of the lever 48, determine the extent of approach of the friction piece 51 to the friction disk 32. In other words, by a partial rotation of the adjusting post 62 the position of the friction piece 51 can be varied so as to permit the motor to operate at a speed which will produce the desired tones.

The mechanism by means of which the motor may be started at will and stopped automatically will now be described. Referring first to Figs. 2 and 4, it will be observed that I have fulcrumed at 63, in a suitable bracket or hanger 64, a brake lever 65 which is equipped at one end with a brake block or shoe 66 of any suitable material of sufficient width to lie in proximity to the periphery of the friction disk 32 in any of its normal movements longitudinally of the governor shaft 31. When this brake shoe is in contact with the disk 32 the motor will be held against rotation but when the shoe is retracted from engagement with the disk the motor will be permitted to run at the speed determined by the centrifugal governor and the speed-controlling device hereinbefore described.

Rearwardly of the motor, as shown in Figs. 1, 2 and 4, I have mounted upon the lower face of the plate 15 a bracket construction comprising a plate 67 provided at its ends with a pair of downwardly projecting portions 68. Near the lower ends of these downwardly projecting portions I have journaled a rock shaft 69 provided at one end with a disk 71 carrying a crank pin 72 which is engaged in the bifurcated end 73 of the brake lever 65, so that upon rotative movement of this rock shaft in a counter-clockwise direction, viewing Fig. 4, the application of the brake block 66 to the disk 32 will be accentuated while upon clockwise ro-



tation of the shaft the brake block will be retracted by the lever 65 from engagement with the disk. An arm 74, fixedly attached to the rock shaft 69 intermediate its ends and projecting radially therefrom, is connected to a stationary stud or ear 75 by means of a contractile spring 76 which tends to rotate the shaft through the intermediary of the arm 74 in a counterclockwise direction, viewing Fig. 4, thereby normally applying the brake. The rocking movement of the shaft 69 under the influence of the spring 76 is limited by abutment of the brake shoe 66 against the periphery of the friction disk 32.

Forwardly of the rock shaft 69 a rod or bar 77 is mounted in the downwardly extending portion 68 in parallel relation with the rock shaft so that the rock shaft and this bar form in effect a guideway upon which an arm 78 is adapted to slide back and forth longitudinally of the shaft and bar. This arm is provided with openings through which the rock shaft and bar 77 extend and for the purpose of steadying the bar its forward end is turned rearwardly as indicated at 79 into parallel relation with the main portion of the arm, this rearwardly turned portion being also provided with openings to receive the rock shaft and the bar 77 whereby the arm is steadied and accurately guided during its sliding movements. Between the parallel portions of the arm a latch bar 81 is also slidably mounted upon the rock shaft, this latch bar being also bent to provide a rearwardly extending portion 82 parallel with the main portion of the latch bar, both portions being provided with openings to receive the rock shaft, and the extremity of the rearwardly extending portion is reduced and turned forwardly, as indicated at 83, and is slidably engaged in a longitudinal groove 84 formed in the rock shaft to thereby spline the latch bar upon the rock shaft so that it will slide longitudinally of the shaft but will be incapable of rotation relatively to the shaft. It will thus be obvious that the latch bar travels back and forth along the rock shaft with the arm 78, but instead of remaining horizontal as the arm does it partakes of the oscillatory movements of the rock shaft, so that the extremity of the latch bar moves upwardly and downwardly relatively to the arm 78.

Referring now to Figs. 2, 5 and 6, it will be observed that at a little distance from the end of the arm 78 I have formed, by bending over the metal of the arm, a pair of ears 85 between which upon a pintle 86 there is pivoted a latch 87 provided with a contact portion 88 of felt or other suitable material adapted to be engaged by the sound tube as the tone arm travels toward the center of the record. A spring 89 coiled about the pintle 86 with its opposite ends bearing against

the end of the arm and the outer end of the latch respectively, normally holds the latch in the position shown in Fig. 2. The inner or forward end of the latch is turned upwardly as indicated by reference character 91 in Figs. 5 and 6, and at the edge proximate to the arm 78 is provided with a notch 92 adapted to engage beneath the end of the latch bar 81 when the latch bar has been depressed into the position shown in dotted lines in Fig. 5. The latch bar is thereby held in this depressed position so that the rock shaft through the intermediary of the lever 65 holds the brake shoe in retracted position and permits the motor to run. An adjustable screw 93 threaded through the arm 78 limits the swinging movement of the latch when it is operated to release the latch bar.

The latch bar 81 and the arm 78 carrying the rod 77 is moved longitudinally of the elongated opening 35 in the plate 15 to bring the contact member 88 into engagement with the sound tube when the parts are set for stopping position by means of manually operable mechanism which will now be described. A bell crank lever comprising the arms 94 and 95 is pivotally mounted upon a pin or fulcrum rod 96 suspended in a bracket 97 from the lower face of the plate 15, and the arm 94 is connected with the arm 78 by means of a link 98. The arm 95 is connected by a link 99 with an arm 101 secured upon the lower end of a post 102 which projects upwardly through the plate 15 and is equipped at its upper end with a knurled knob 103 by means of which the post may be oscillated in one direction or the other to thereby move the arm 78 carrying the latch into the desired stopping position in the path of movement of the sound tube.

Upon a bracket 104 projecting laterally from one of the downwardly projecting portions 68, there is pivotally mounted upon a screw pin 105 a bell crank comprising the arms 106 and 107. The arm 107 is curved, as shown in Fig. 2, to clear the rear edge of the downwardly extending portion 68 and its extremity is disposed in front of the radially projecting arm 74 secured to the rock shaft. The other arm projects across the opening 35 in the plate 15 into the path of movement of the sound tube so that when the tone arm is swung to starting position, or, in other words, the sound box is moved to the periphery of the record disk this arm will be engaged by the sound tube, thereby swinging the bell crank on its pivot and moving the arm 107 rearwardly against the arm 74 thereby rocking the rock shaft 69 to swing the latch bar 81 downwardly into latching engagement with the latch 87. To prevent noise which might result from contact of the metal arm 107 with the metal portion 68 the curved portion of arm 107 is



preferably covered with rubber tubing 108 or other similar soft material, and to prevent noise and also marring of the sound tube the arm 106 is also provided with a covering of similar material 109. The rock shaft 69 is also provided at the limits of movement of the arm 78 with noiseless buffer washers 111 and 112 against which the arm strikes when it reaches the end of its movement in both directions.

The operation of the mechanism illustrated as embodying my invention is substantially as follows: Assuming that the parts are in the position shown in Fig. 2 with the brake shoe in contact with the friction disk 32, a record is placed upon the turntable 19 and the tone arm is moved inwardly until the stylus 39 rests in the last record groove near the center of the disk. The knob 103 is now rotated so as to move the arm 78 across the opening 35 until the contact piece 88 abuts against the sound tube, which position can readily be determined by the fact that further rotative movement of the knob 103 will be prevented by abutment of the contact piece against the sound tube. The tone arm is swung outwardly to bring the stylus to the periphery of the disk, which movement will bring the sound tube against the arm 106 which it will swing on its pivot thereby rocking the shaft 69 through the intermediary of the arm 107 and the arm 74 so as to lower the latch bar 81 into latching engagement with the latch 87 and at the same time rock the lever 65 so as to release the brake. The motor, as soon as the brake is released, will begin to operate thereby revolving the record disk and the instrument will begin to reproduce the record. Should the speed be too high or too low to properly produce the tones inscribed on the record the speed of the motor can be regulated by turning the knob mounted upon the upper end of the regulating post 62. When the record has been reproduced and the stylus is engaged in the inner record groove the sound tube will abut against the contact piece 88 of the latch 87 and thereby swing the latch upon its pivot to release the latch bar 81, permitting the spring 76 to rock the shaft 69 and thereby apply the brake which stops the motor.

It is believed that my invention and its mode of operation will be readily understood from the foregoing without further description, but it should be understood that the mechanical construction and arrangement of the various details shown and described are capable of considerable modification and variation without departing from the spirit of the invention as set forth in the following claims.

I claim:

1. In a motor-controlling mechanism for talking machines, the combination of a

motor, a brake therefor, a spring for applying said brake, a bodily shiftable latch mechanism located in the path of a movable element of the machine and adapted to hold said brake in retracted position, said brake being released through contact of said movable element with said latch mechanism, manually operable means for positioning said latch mechanism at any desired position in said path of movement, and means engageable by said movable element for withdrawing the brake and causing it to be held by said latch mechanism.

2. In a motor-controlling mechanism for talking machines, the combination of a motor, a brake therefor, a spring tending normally to apply said brake, a bodily adjustable arm extending across the path of movement of a movable element of the machine, a latch pivoted thereon, manual means for adjusting said arm to position said latch in any desired position in said path of movement, a latch bar connected with the brake and adapted to be engaged with said latch to hold the brake in inoperative position, and means projecting across said path of movement in a position to be actuated by said movable element whereby said latch bar is engaged with said latch when said movable element is brought into contact with said means.

3. In a motor-controlling mechanism for talking machines, the combination of a motor, a brake therefor, a spring for applying said brake, a guideway including an oscillatory member, an arm mounted for transverse sliding movement on said guideway, a latch carried by said arm, a latch bar splined on said oscillatory member and adapted to be engaged with said latch, connections between said oscillatory member and the brake whereby the brake is held in inoperative position when said latch-bar is engaged with said latch, and means for oscillating said member against the force of said brake-applying spring to move said latch-bar into engagement with said latch.

4. In a motor-controlling mechanism for talking machines, the combination of a motor, a brake therefor, a spring for applying said brake, a rock shaft, an arm mounted to slide longitudinally of said shaft, a latch-bar splined to the shaft and slidable with said arm, a latch carried by said arm in position to engage and retain said latch-bar, manually operable means for moving said arm to position the latch in the path of movement of a movable element of the machine, a connection between said brake and said rock shaft, and means also adapted to be actuated by said movable element of the machine for rocking said shaft to bring said latch-bar into locking relation with said latch.

5. In a motor-controlling mechanism for



talking machines, the combination of a motor, a brake therefor, a spring tending normally to apply said brake, means for withdrawing said brake including a member  
5 mounted in the path of movement of a movable element of the machine, a rock shaft operable by said member, and connections between said rock shaft and said brake, and means for locking said brake in retracted  
10 position including a latch-bar splined on said rock shaft, an arm slidable with said latch-bar along the shaft, and a latch carried

by said arm in the path of movement of said movable element, said latch being adapted to lock said latch-bar and to release the same  
15 when engaged by said movable element.

6. In a motor-controlling mechanism for talking machines, the combination of a motor, a brake therefor, a pivotally mounted latch-bar connected with said brake, a latch  
20 adapted to retain said latch-bar, and an adjusting screw for controlling the extent of movement of said latch.

ALBERT A. HUSEBY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



**AUTOMATICALLY OPERATED TALKING  
MACHINE.**

#1,224,979-----L.P. Valiquet,  
Patented-May 8th, 1917.  
Filed- October 27th, 1904.



L. P. VALIQUET.  
AUTOMATICALLY OPERATED TALKING MACHINE.  
APPLICATION FILED OCT. 27, 1904.

1,224,979.

Patented May 8, 1917.

14 SHEETS—SHEET 1.

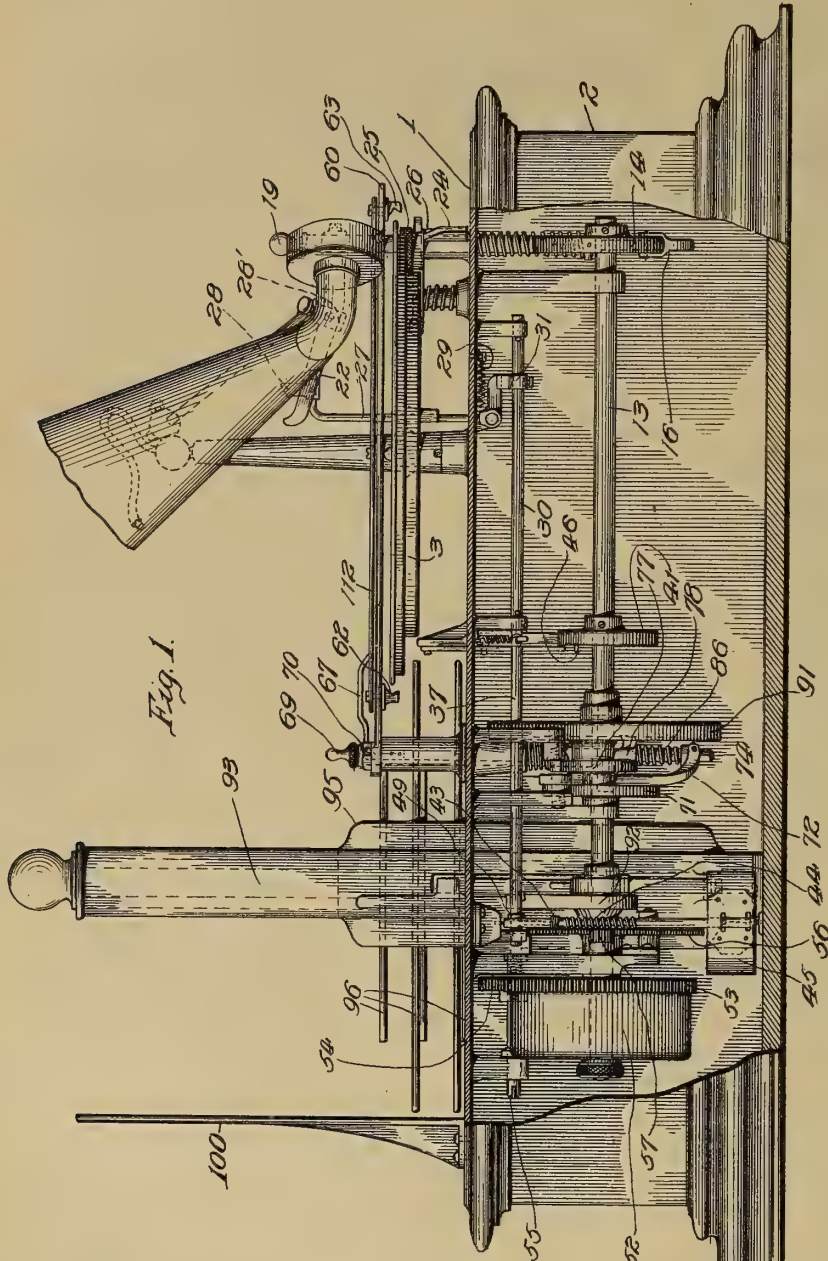


Fig. 1.

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14 SHEETS—SHEET 2.

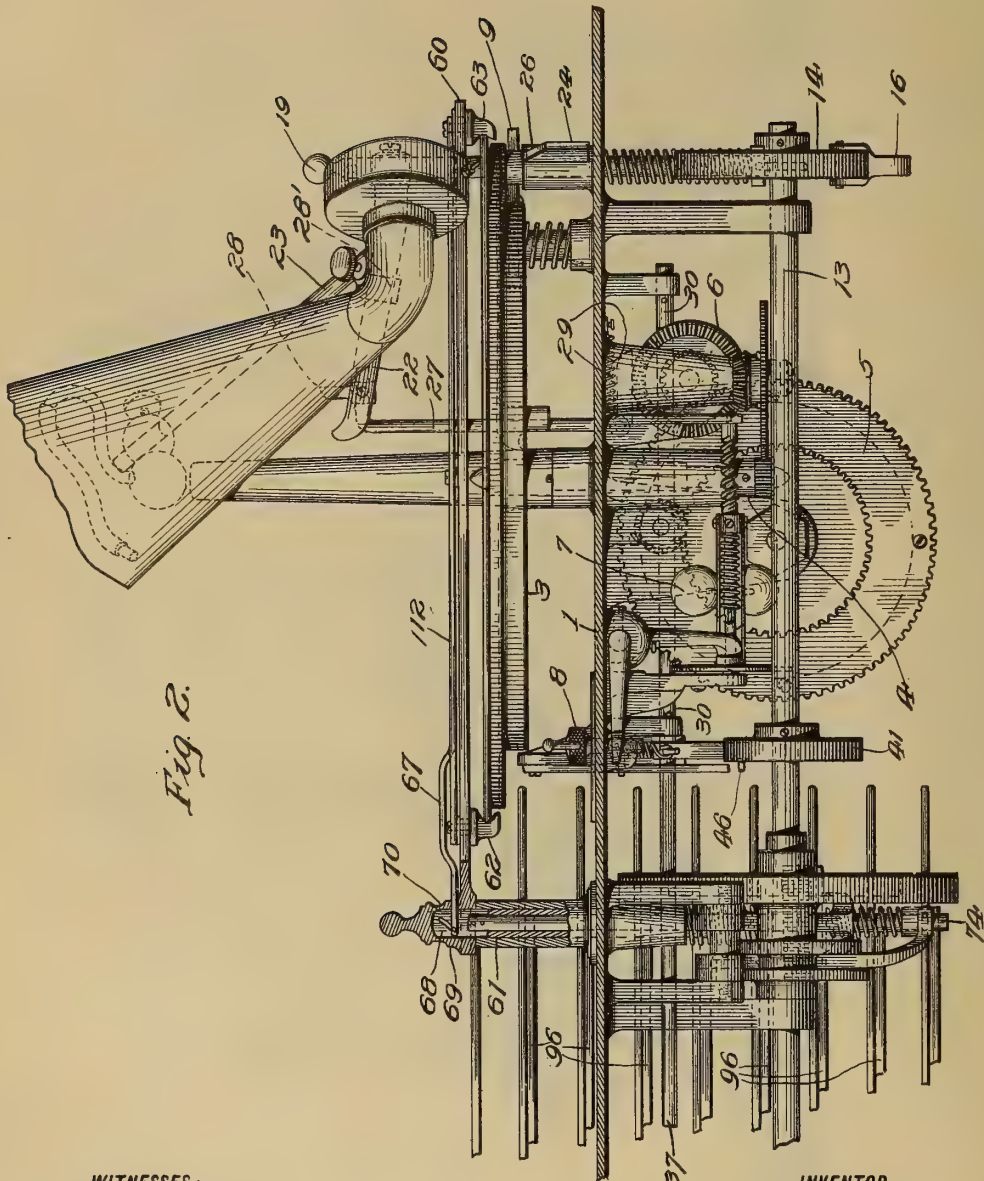


Fig. 2.

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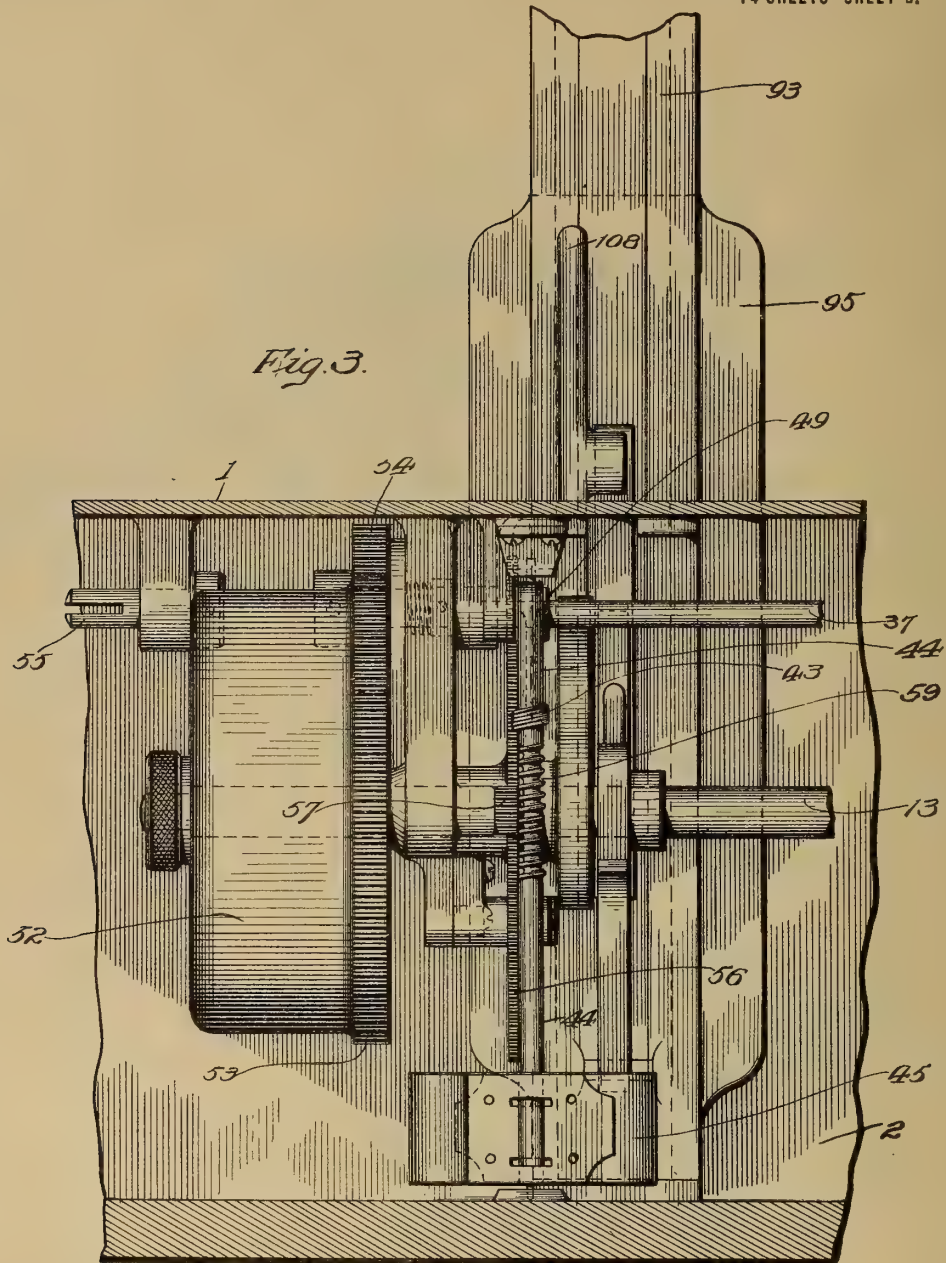




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14 SHEETS—SHEET 3.



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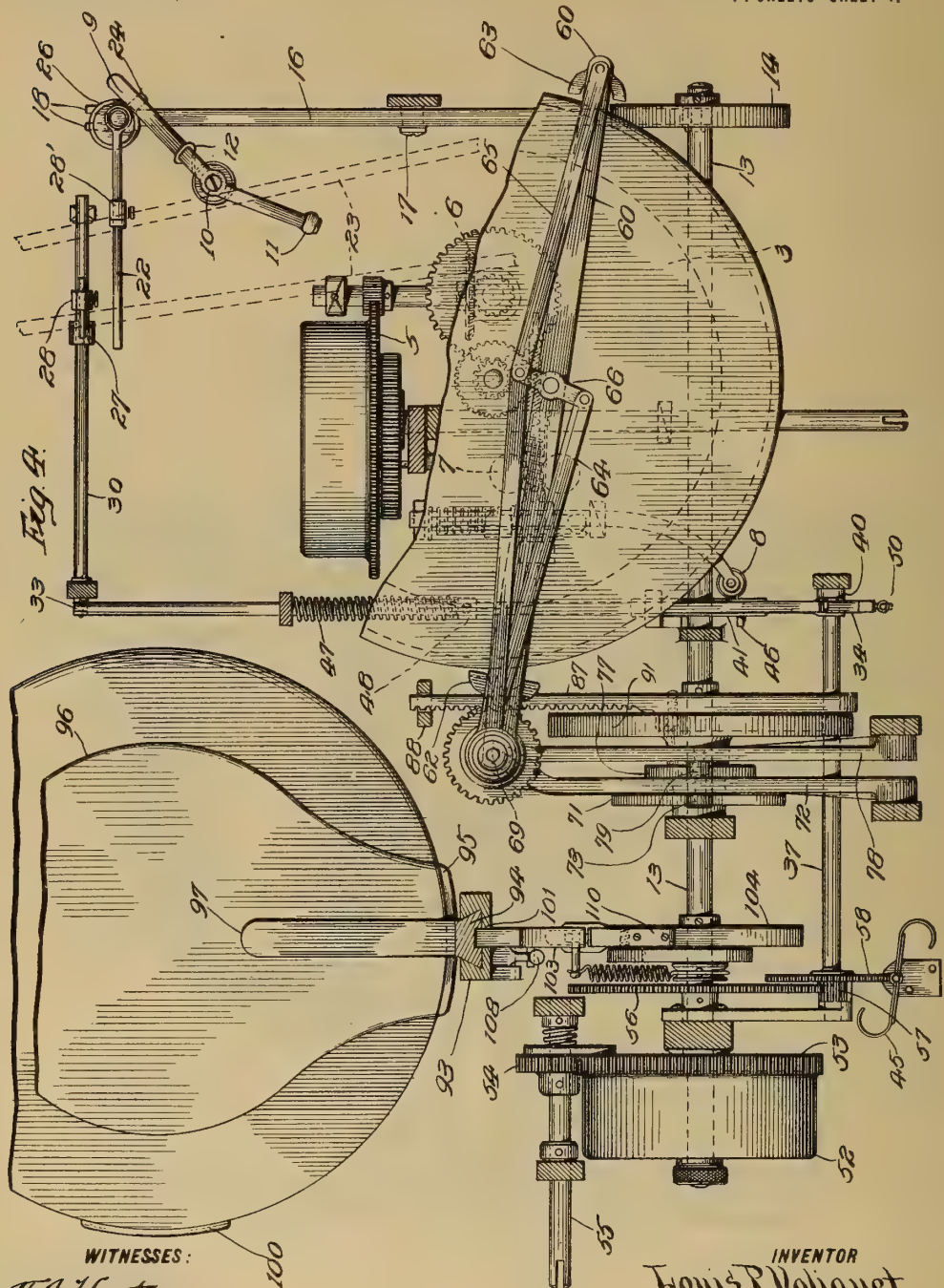


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14 SHEETS—SHEET 4.



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14 SHEETS—SHEET 5.

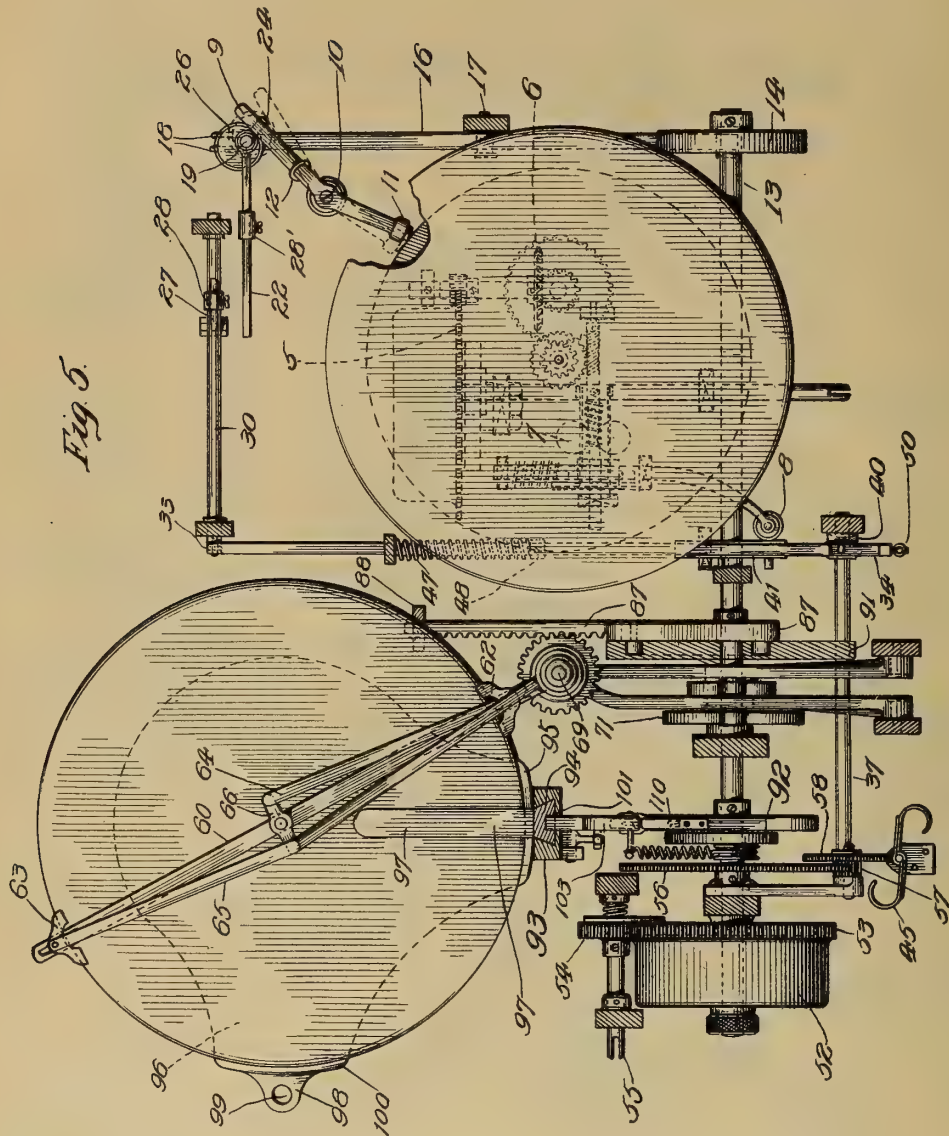


Fig 5.

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14 SHEETS—SHEET 6.

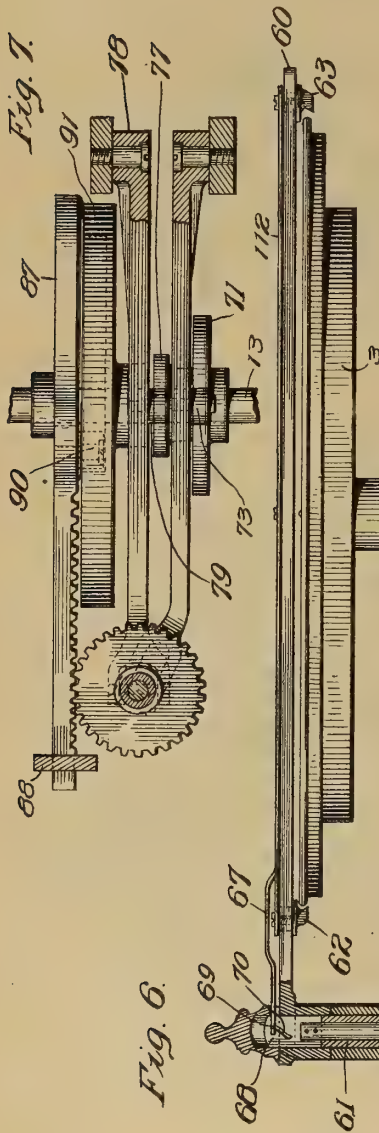


Fig. 8.

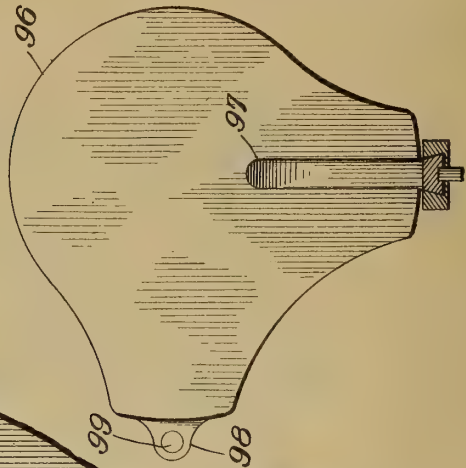
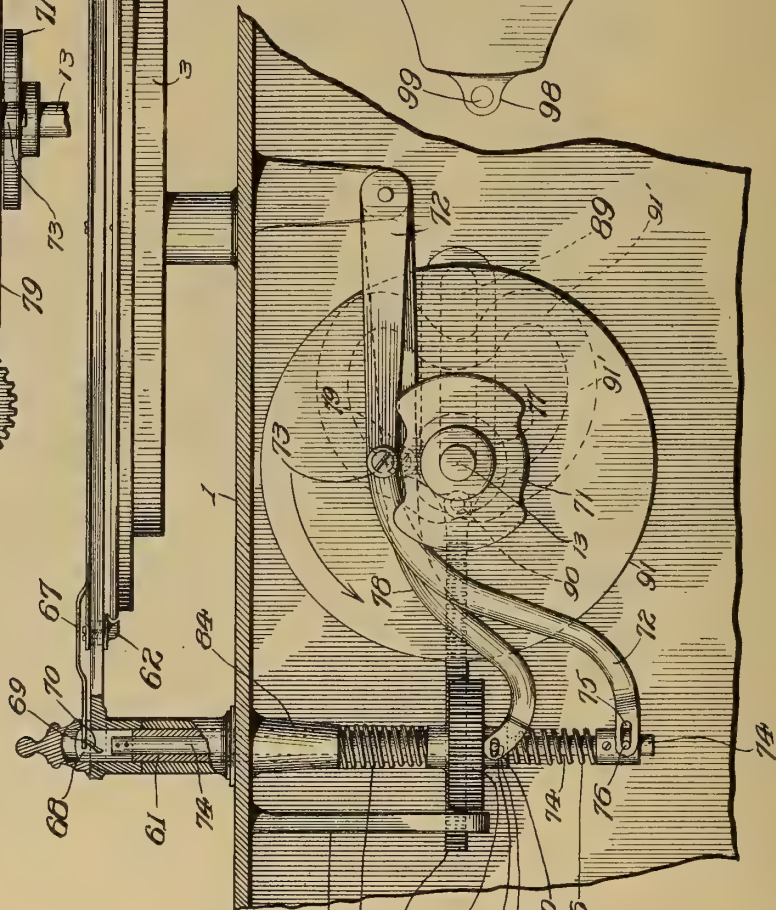


Fig. 6.



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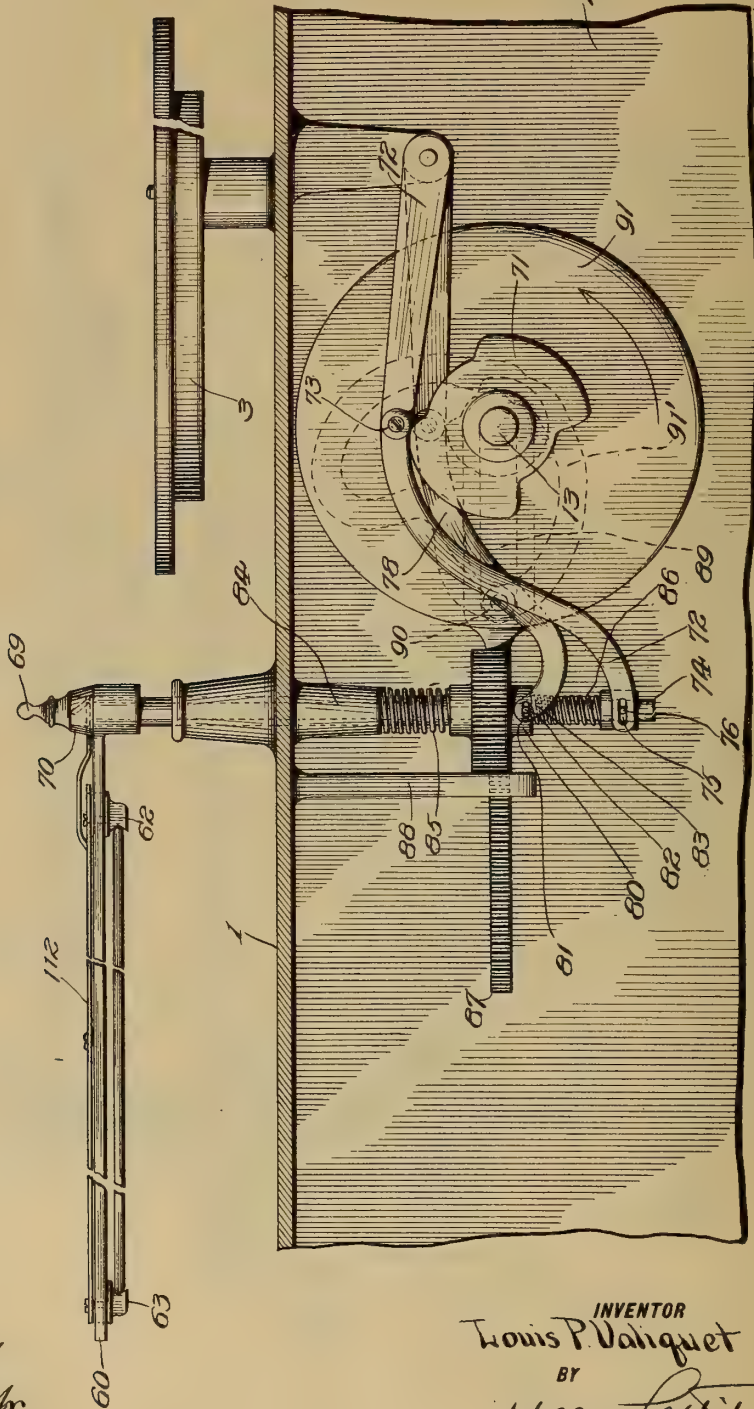


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 APPLICATION FILED OCT. 27, 1904.

1,224,979.

Patented May 8, 1917.  
 14 SHEETS—SHEET 7.

Fig. 9.



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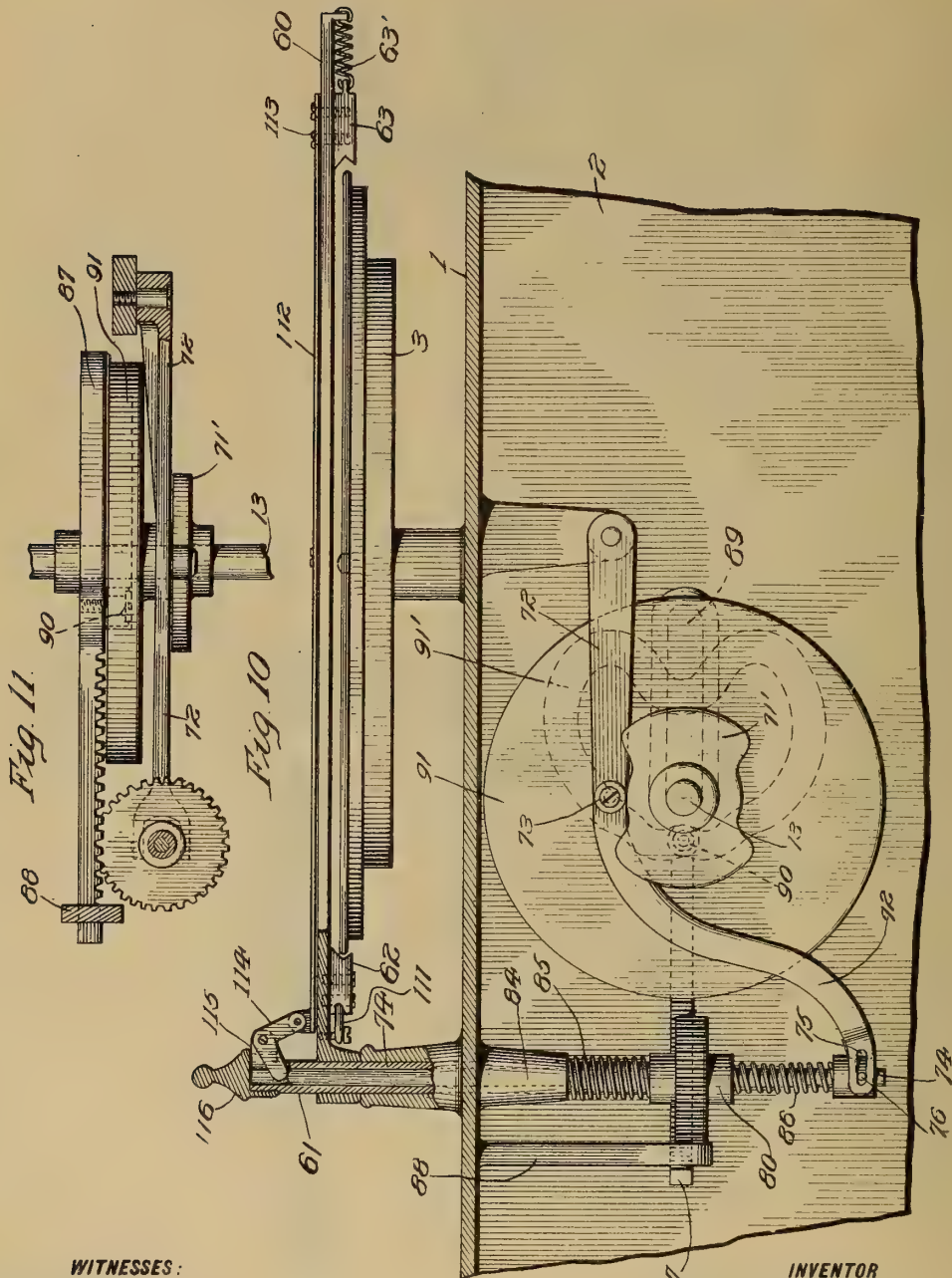
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 14 SHEETS—SHEET 8.



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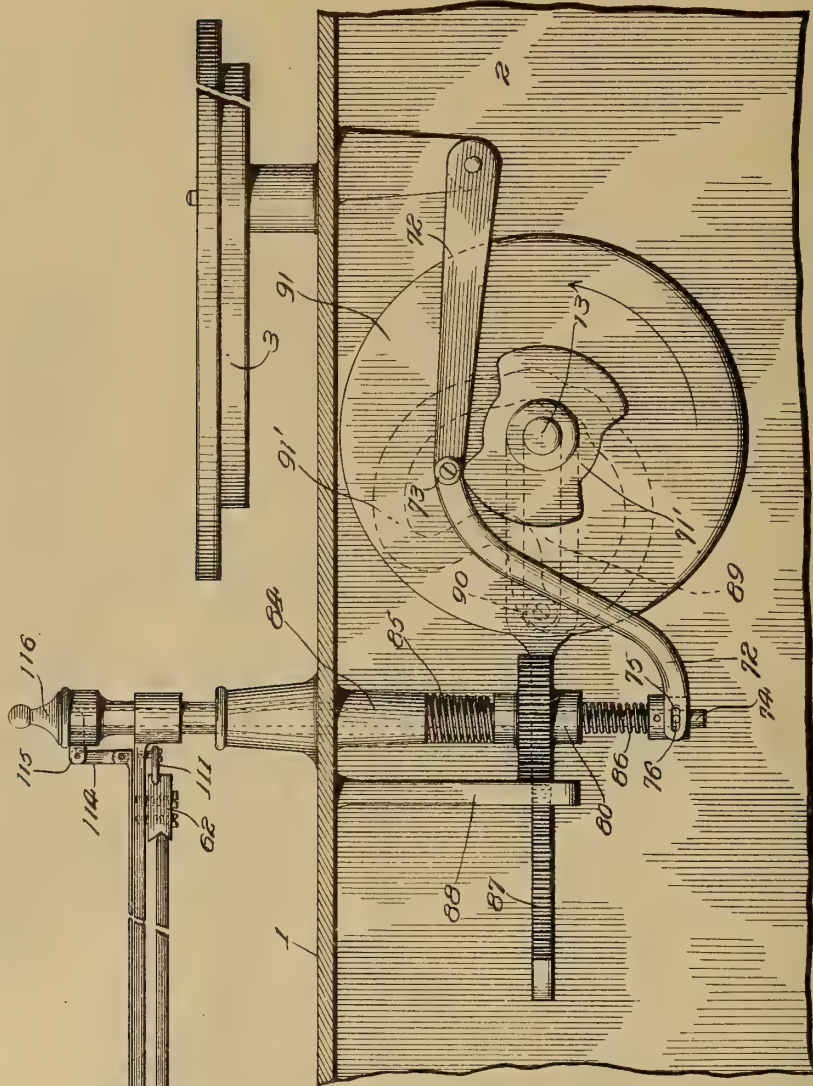
L. P. VALIQUET.  
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1,224,979.

Patented May 8, 1917.

14 SHEETS—SHEET 9.

Fig. 12.



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1,224,979.

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14 SHEETS—SHEET 10.

Fig. 14.

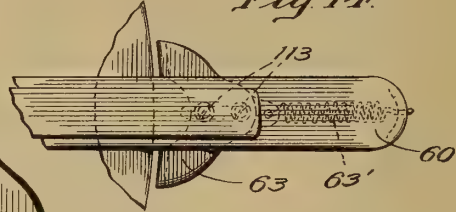


Fig. 13.

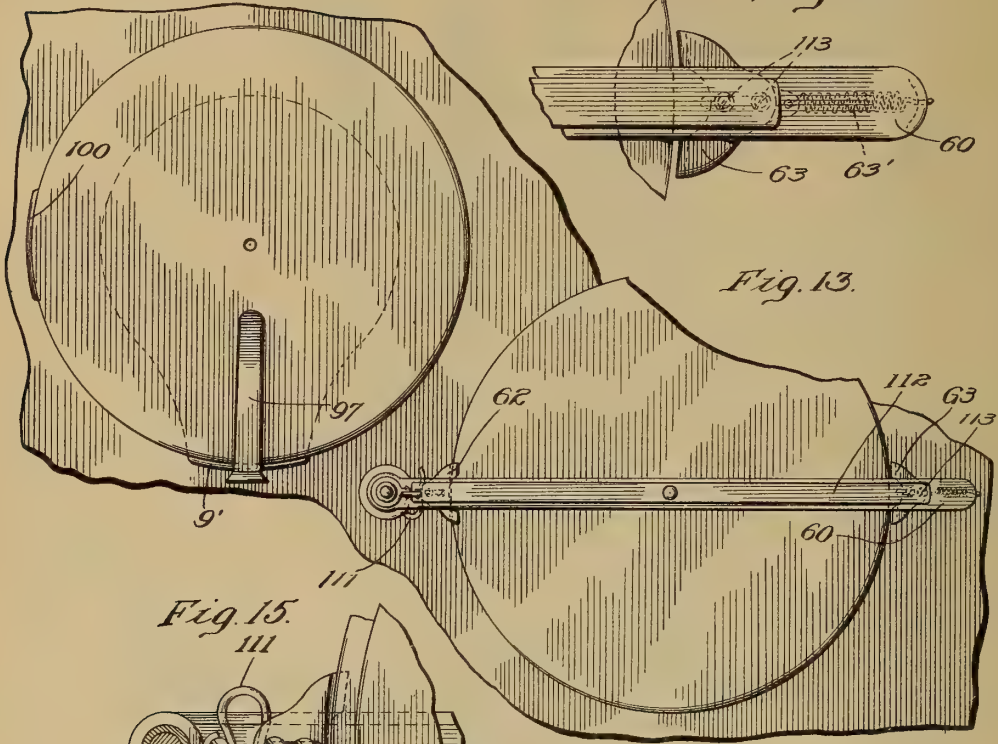


Fig. 15.

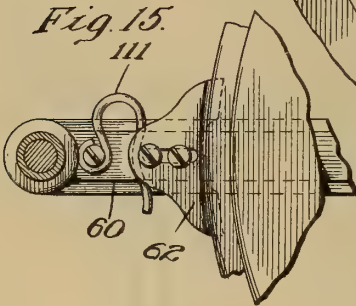


Fig. 17.

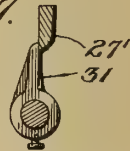
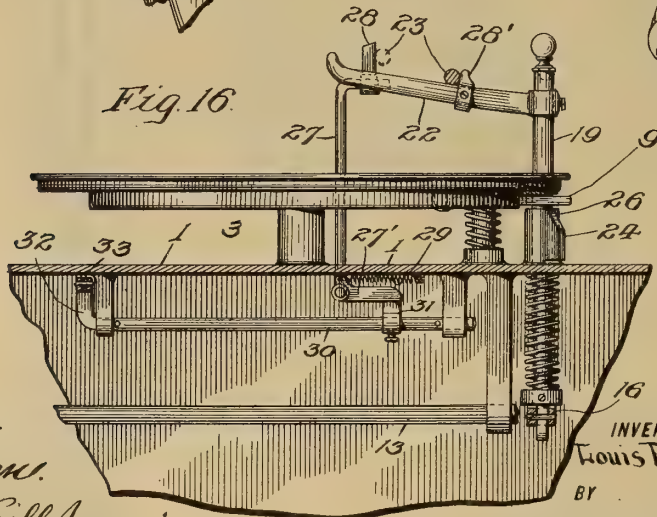


Fig. 16.



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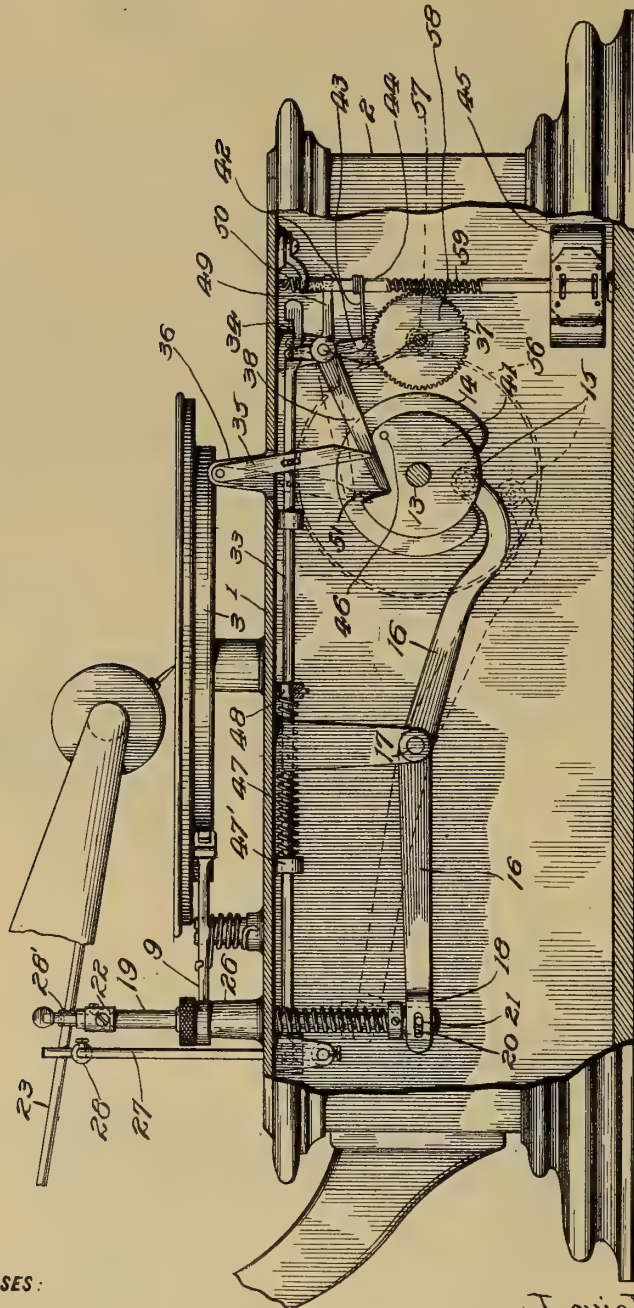


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14 SHEETS—SHEET 11.

Fig. 18.



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L. P. VALIQUET.  
AUTOMATICALLY OPERATED TALKING MACHINE.  
APPLICATION FILED OCT. 27, 1904.

1,224,979.

Patented May 8, 1917.  
14 SHEETS—SHEET 12.

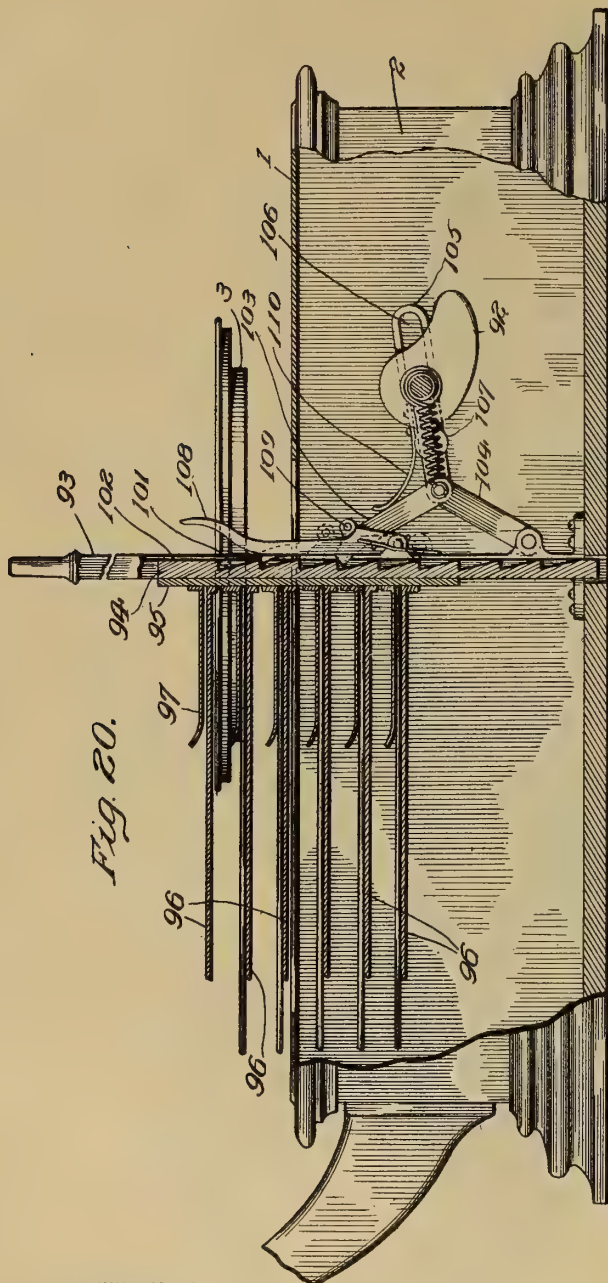


Fig. 20.

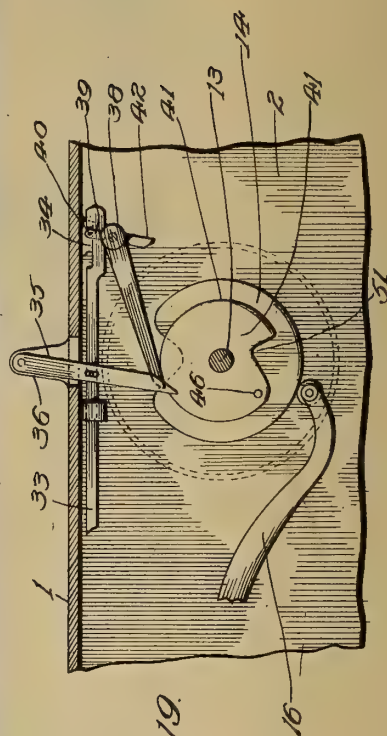


Fig. 19.

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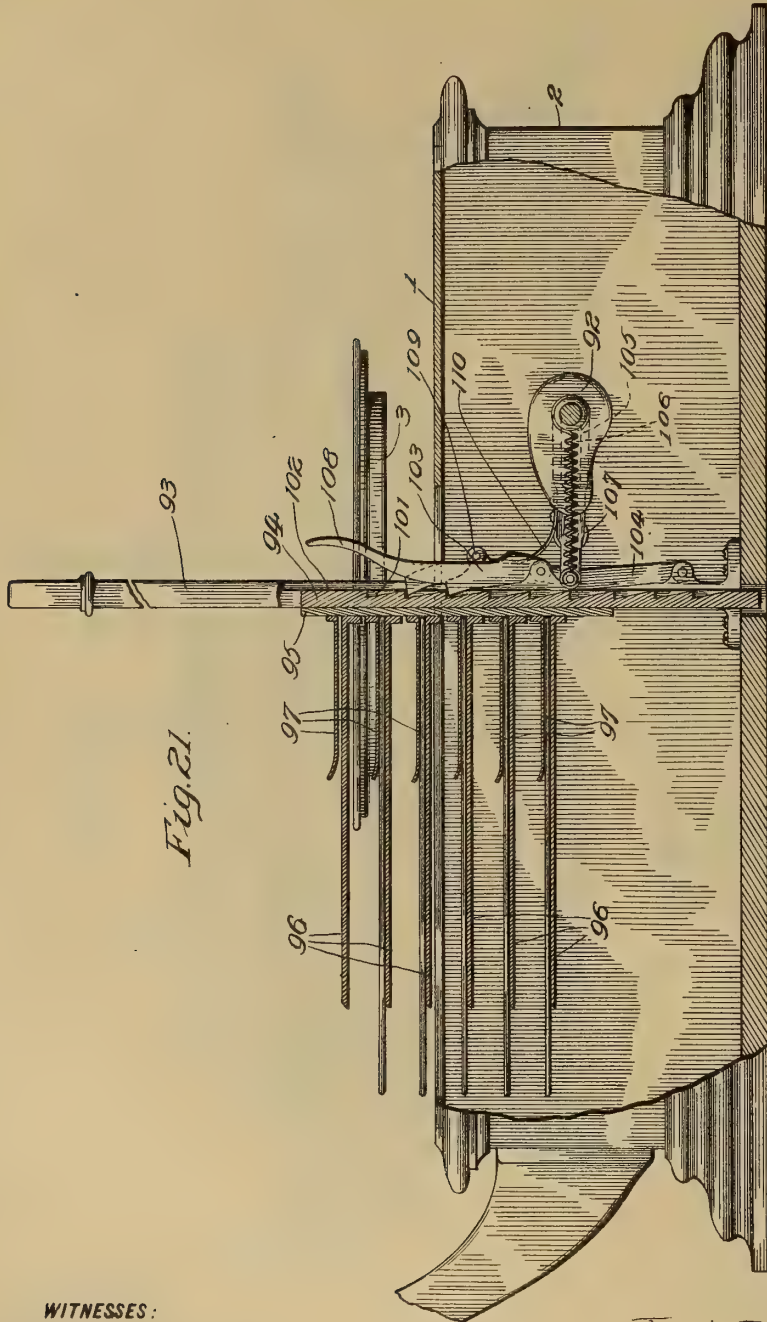


Fig. 21.

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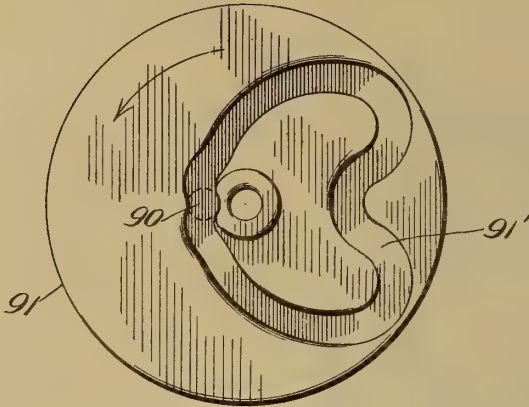
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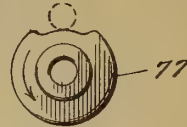
Patented May 8, 1917.

14 SHEETS—SHEET 14.

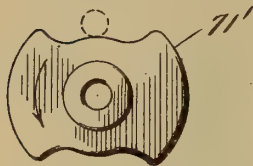
*Fig. 22.*



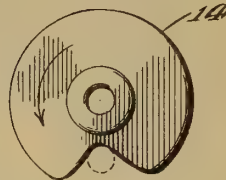
*Fig. 25.*



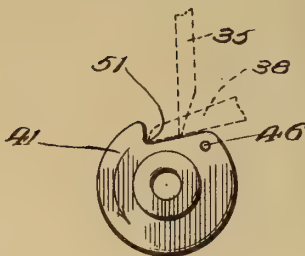
*Fig. 23.*



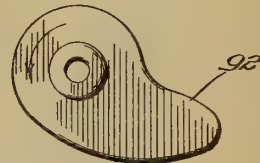
*Fig. 26.*



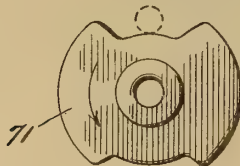
*Fig. 24.*



*Fig. 27.*



*Fig. 28.*



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# UNITED STATES PATENT OFFICE.

LOUIS P. VALIQUET, OF NEW YORK, N. Y., ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

## AUTOMATICALLY-OPERATED TALKING-MACHINE.

1,224,979.

Specification of Letters Patent. Patented May 8, 1917.

Application filed October 27, 1904. Serial No. 230,202.

*To all whom it may concern:*

Be it known that I, LOUIS P. VALIQUET, a citizen of the United States, and a resident of the city of New York, State of New York, have invented certain new and useful Improvements in Automatically-Operated Talking-Machines, of which the following is a full, clear, and complete disclosure.

The main objects of this invention are to provide an improved automatic talking machine; to provide an improved automatic talking machine adapted for disk records; to provide an automatic talking machine having a record support, a rack or magazine for holding a plurality of records, and means for automatically and selectively transferring a record from the rack to the support and for returning the same to its original position in and with respect to the rack after it has been played, and to provide other improvements as will appear hereinafter.

Broadly, one embodiment of this invention comprises, as is hereinafter described in detail, a mechanism actuated by a main motor for reproducing sounds from a disk record, and a second mechanism actuated by an auxiliary motor for changing the records. The first mentioned of these mechanisms includes a turntable, a swinging tone arm, a sound box carried thereby and a main motor. The second mentioned of these mechanisms includes a record magazine, a record carrier arm provided with clamps and arranged to transfer records between the turntable and the magazine, and an auxiliary motor for actuating these parts.

The main motor first performs its function which continues throughout the reproduction of sound from the record and then starts the auxiliary motor, the main motor then being automatically stopped and allowed to remain stationary during the operation of the auxiliary motor and until the record has been replaced by a record from the magazine. The auxiliary motor is then automatically stopped and the main motor automatically and substantially simultaneously started, to repeat the cycle of operations.

The operation of this talking machine, in which each movement following the initial starting, is brought about automatically,

may be briefly summarized somewhat in detail as follows:—

When the parts of the mechanisms are in the initial or starting position, a sound record is in operative position on the turntable, both main and auxiliary motors are wound and the stylus of the sound box is in operative engagement with the record. The apparatus may then be started by manually turning a nut which releases the brake shoe and starts the main motor, thus rotating the turntable. After the stylus has traversed the extent of the record groove the reproducer arm encounters a stop, whereupon the auxiliary motor is set in motion, the arm and the stylus attached thereto are raised clear of the record, the turntable and the primary motor are simultaneously stopped and the reproducer arm is immediately gravitated toward the outer circumference of the turntable until the stylus is suspended directly above its original starting-point.

The auxiliary motor upon being started swings the record carrier arm from its initial position, just beyond the center of the turntable, toward the record magazine to a position immediately above the center of the record, where it holds the carrier arm stationary momentarily, while the clamps thereon are actuated to grip the record on the turntable, raises the arm and record until the latter is free of engagement with the projecting end of the turntable spindle, continues the movement of the carrier arm in its course toward the vacant magazine shelf in alinement therewith, stops it when directly above the shelf, lowers the arm until the record rests upon the shelf, actuates its clamps to release the record, retreats it to a point without the path of vertical movement of the record rack, raises the magazine to bring a second record into alinement with the turntable, swings the carrier arm to a position immediately above the second record, stops it when directly thereover, actuates its clamps to grip the new record, raises the arm and record until the latter is clear of the shelf, swings the arm and record gripped thereby to a position concentric with the turntable, stops the arm momentarily, lowers the arm and record until the latter rests upon the turntable and engages the projecting spindle end thereof, actuates its clamps to release the new record and then

removes the arm to its original initial position, simultaneously lowering the reproducer arm and stylus until the latter engages in the groove of the new record, releases the turntable and its actuating motor, and substantially simultaneously stops itself. This completes one cycle of operation of the apparatus and it is repeated until all the records in the magazine have been played or until the turntable motor is stopped by manually operating the brake mechanism.

In the accompanying drawings Figure 1 is a side elevation of my improved automatic apparatus, showing the casing inclosing the operating mechanism cut away to expose the said operating mechanism; Fig. 2, an elevation similar to Fig. 1 but showing only the turntable motor, the starting and stopping mechanism, the sound box operating mechanism, and the mechanism for operating the record carrier; Fig. 3 is an enlarged elevation of the fan wheel or escapement, the cams and spring drum or motor for operating the main or cam shaft; Fig. 4, a plan view of the device as shown in Fig. 1, the reproducing parts being omitted; Fig. 5, a plan view similar to Fig. 4, but showing the record carrying arm in position over the record rack; Fig. 6, an elevation of the cams and that part of the apparatus which operates the record carrier arm; Fig. 7, a detail plan view of the cams and gearing shown in Fig. 6; Fig. 8, a plan view of one of the shelves of the record rack; Fig. 9 is an elevation similar to Fig. 6, but showing the rack carrying arm in the position in which it would be when over the record rack, said rack being omitted for clearness; Fig. 10, a modified form of mechanism for operating the record carrier; Fig. 11, a detail plan view of the cams and gearing shown in Fig. 10; Fig. 12 is an elevation similar to that shown in Fig. 10, but showing the rack carrying arm in the position in which it would be when over the record rack; Fig. 13 is a plan view of the modified form of record carrying arm shown in Figs. 10, 11, and 12; Figs. 14 and 15 are detail views of the clamps or jaws used in connection with the modified form of the record carrier showing the three figures last above mentioned; Fig. 16 is an elevation of the apparatus operated by the reproducer arm for starting and stopping the turntable motor, and for starting and stopping the operation of the record carrier and record rack; Fig. 17 is a sectional view of the latch or lock, which is actuated by the movement of the reproducer arm; Fig. 18 is a sectional view showing the mechanism referred to in connection with Fig. 16, and also showing the cams, latches, and other parts which operate the record carrying mechanism and the record rack; Fig. 19 is a detail elevation of the latches, cams, etc., shown in Fig. 18,

but in different positions; Fig. 20 is a sectional view of the record rack and mechanism for raising and lowering the same; Fig. 21 is an elevation similar to Fig. 20, showing the record rack and parts connected thereto in a different position; Figs. 22 to 28, inclusive, are views showing the different cams used in my improved apparatus detached from the other parts.

Referring to the drawings, one embodiment of this invention comprises a suitable supporting plate or top 1 forming the top of a cabinet 2 for the apparatus and from which depend the principal supports for the bearings and other parts which comprise the operating mechanism. Hereafter these supports will not ordinarily be referred to specifically, for it is understood that they may be interposed at any suitable point without changing the nature of the invention. The cabinet or casing 2 is preferably made rectangular in shape, and of greater length than width. The casing contains in its right-hand portion, as shown in Fig. 2, a motor for rotating the turntable mechanism for reproducing the record, mechanism for moving the reproducer, a stopping and starting mechanism for the turntable, and mechanism for starting and stopping the cam shaft; and in its left hand portion, as shown in Fig. 1, the casing contains a motor for rotating the cam shaft for operating the record carrying arm, and for raising and lowering the record rack.

The motor for rotating the turntable may be of any approved or well known construction, and in this instance includes the usual spring drums, gearing, centrifugal governor, and the regulating brake. These parts have been omitted, except in Figs. 2, 4, and 5, for the sake of clearness. As shown in these figures, the device comprises a turntable 3, a turntable spindle 4, a spring drum 5, gearing 6 connecting the spring drum 5 and the turntable spindle 4, a centrifugal governor 7, and a regulator 8 for said governor.

The starting and stopping of the turntable motor is brought about primarily through the brake lever 9, which is fulcrumed upon the casing at 10, and carries on its inner end the brake shoe 11. Said fulcrum 10 is encircled by a coiled spring 12 which tends to hold said brake shoe 11 out of contact with the turntable 3. Although the lever 9 may be manually operated to start and stop the turntable, by means to be described later, yet the same is also automatically operated by the mechanism which raises and lowers the sound box in relation to the record, so that when the said sound box is out of engagement with the rack and while the record is being changed, the turntable will not revolve.

For thus automatically raising and low-



er ing the sound box or sound reproducer there is fixed upon the main or cam shaft 13, which is operated in a manner herein-  
 after described, a cam 14 of the form shown  
 in Fig. 26, and further shown in position  
 in Fig. 18. The cam 14 coöperates with a  
 follower 15, which is carried upon one end  
 of a lever 16 which is fulcrumed as at 17  
 and its opposite end provided with a U-  
 shaped portion 18 adapted to embrace the  
 lower end of a vertical rod or spindle 19.  
 Said U-shaped portion 18 is provided with  
 slots 20, through which pass a pin 21 which  
 connects said lever 16 with said rod 19.  
 The upper end of the rod 19 carries an in-  
 clined arm 22, which is adapted to engage  
 the under side of the reproducer arm 23.  
 It will thus be seen that when the arm 22  
 is raised or lowered, by reason of its connec-  
 tion with the cam 14, the sound box will  
 be removed from, or brought into contact  
 with, the record.

For actuating the brake shoe 11 to en-  
 gage or disengage the turntable 3, there is  
 fixed upon one side of the vertical rod 19, an  
 inclined projection 24, which is adapted to  
 engage with the outer end of the brake lever  
 9, so that when the said rod 19 is raised said  
 projection will contact with the brake lever  
 9, and thereby force the brake shoe 11 into  
 engagement with the turntable. When the  
 rod 19 is lowered, the spring 12 forces the  
 brake shoe away from the turntable. The  
 turntable is thus started and stopped at  
 times corresponding with the putting of the  
 sound box into and out of operation.

For starting and stopping the rotation of  
 the turntable at other times than when au-  
 tomatically started and stopped by a verti-  
 cal movement of the rod 19, there is pro-  
 vided an eccentric thumb nut or cam 25 loose  
 on the rod 19, the lower portion of said nut  
 being adapted to contact with the brake lever  
 9, to move the outer end of the same  
 away from the rod 19 so as to throw the  
 brake shoe 11 into engagement with the  
 turntable 3. The eccentric thumb nut 25  
 rests upon the top of the sleeve 26, which  
 projects from the plate 1 when the rod 19  
 is in its lower position. The sleeve 26 also  
 has a slot in the side thereof which accom-  
 modates the inclined projection 24 attached  
 to the rod 19. The inclined arm 22, which  
 extends from the rod 19, is at such an angle  
 to the horizontal that when the sound box  
 and the reproducer arm 23 are adjacent the  
 outer end thereof, a vertical movement of  
 the rod 19 with said arm 22 will cause the  
 reproducer arm 23 to slide down the incline  
 of the arm 22, and thereby carry the said  
 arm 23 with the sound box, or reproducer  
 attached thereto, back to the starting posi-  
 tion adjacent the outer edge of the record.

For starting the record carrier and oper-  
 ating the record rack, there is provided an

upwardly extending arm 27, which is piv-  
 otally connected to the plate 1 and extends  
 therethrough, projecting upwardly and  
 downwardly therefrom, and having at its  
 upper end a lug 28 rigid therewith and  
 adapted to contact with the reproducer  
 arm 23. The lower end of the arm or lever  
 27 is provided within the cabinet 2 with a  
 projection 27' rigid therewith, and extend-  
 ing at right angles thereto, which, on its  
 outer end is provided with an angular edge,  
 as shown in Fig. 16. The upwardly extend-  
 ing arm 27 is held in its normal position by  
 means of a coiled spring 29. Within the  
 casing 2, and below the support plate 1, is  
 suspended a longitudinally extending shaft  
 30, which has fixed adjacent one end there-  
 of a latch or lug 31, and at its opposite end  
 an arm 32 extending at right angles to the  
 axis of the shaft. These parts are shown  
 particularly in Figs. 16 and 17.

Pivottally connected with the arm 32 is  
 a transversely extending rod 33, (see Fig.  
 18) which is supported in suitable bearings  
 projecting from the end to the side of the  
 plate 1, and is provided on its outer end  
 with an elongated notch 34, and is also  
 connected with a depending swinging arm  
 35, which is pivoted at its upper end to  
 a support 36 carried by the plate 1. Sup-  
 ported by said plate 1 is a short, longitudi-  
 nally extending shaft 37, (see Figs. 4 and  
 5) to which is fixed the arm 38, and also  
 an upwardly extending lug 39, (see Fig.  
 19) which carries upon its outer end a pin  
 40 adapted to enter the elongated notch  
 34 in the rod 33. The arm 38 is adapted  
 to engage the periphery of a cam 41 carried  
 on the cam shaft 13. Adjacent the opposite  
 end of the shaft 37 is a downwardly ex-  
 tending lug or latch 42, which is adapted  
 to swing into and out of the path of a radial  
 arm 43, carried on the shaft 44 of the fan  
 wheel governor 45 which controls the speed  
 of an auxiliary motor hereinafter described,  
 for actuating the record changing mech-  
 anism. Upon the cam 41 is carried a trans-  
 versely projecting pin 46, which is adapted  
 to engage the end of the downwardly pro-  
 jecting arm 35, which is attached to the  
 transverse rod 33 in a manner hereinafter  
 to be described. Upon the rod 33, I place  
 a coiled expansion spring 47, one end of  
 which abuts against a downwardly extend-  
 ing bearing 47', and the other end against  
 a collar 48 fixed on said rod 33. To hold  
 the arm 38 in contact with the cam 41, I  
 attach the radial extending arm 49 to the  
 shaft 37, which is held under spring ten-  
 sion by the coiled spring 50, attached to  
 the plate 1.

It is now evident that the starting of the  
 cam or secondary motor is effected by the  
 reproducer arm 23 when it swings into en-  
 gagement at the inner end of its path across



the record, with the contact or lug 28, thereby swinging the arm 27 about its pivot, and disengaging the arm 27' from the latch or lug 31. This will allow the spring 47 to act and move the rod 33 longitudinally forwardly or toward the right, as shown in Fig. 18, which will oscillate the shaft 37, and thereby remove the lug 42 from the path of the arm 43. The fan wheel 45 will then be allowed to rotate, which will cause the cam motor to come into action to revolve the cam shaft 13, and, therefore, the cam 41. As the cam 41 revolves the pin 46 will contact with the end of the downwardly extending arm 35, and move the same toward the left. This arm 35 being connected to the rod 33 will force the same also toward the left against the pressure of the spring 47, which will cause the shaft 30 to turn to its normal position, and again cause the latch 31 to engage the arm 27'. The cam 41 will then continue to revolve, but the latch 31 will still be held in its engaged position until again released by the reproducer arm. A continued movement of the cam 41 retains the lug 42 out of the path of the arm 43 until the recess 51, in the cam 41, allows the arm 38 to drop, which turns the shaft 37 and carries the lug 42 into the path of the arm 43, thus stopping the turn-table motor immediately after the auxiliary or cam motor has been started.

The cam motor consists of the usual spring barrel or drum 52, which has on its periphery a large gear 53, which is adapted to mesh with a pinion 54, carried on the winding shaft 55. The spring barrel 52 is carried on the main cam shaft 13, and the inner end of the spring (not shown) is, of course, connected to said shaft while its outer end is connected to the spring barrel. The fan governor 45 is connected with the cam shaft 13 by means of a train of gearing, including the spur gear 56, pinion 57, the spur gear 58, and the worm 59, carried on the governor shaft 44.

For the lifting of a record from the turntable, placing the same upon the record rack, engaging a new record and placing the same upon the turn-table, there is provided a pivoted record carrier arm 60, which is carried adjacent the upper end of a tube or bushing 61, and has slidably connected to the underside thereof two jaws, 62 and 63, which form a clamp to engage the periphery of the record. The jaws 62 and 63 are moved longitudinally of the arm 60 by means of two links or pitmen 64 and 65, which are connected to the opposite ends respectively of a transverse lever 66 which is pivoted intermediate of its ends on the central portion of the carrier arm 60. The lever 66 is reciprocated upon its fulcrum by means of a

link 67, which is operated by a slotted cam plate 68, which is reciprocated vertically, in a manner hereinafter described, so that a pin 69 carried by the link or pitman 67 is made to traverse an inclined slot 70 in the cam plate 68.

For lifting the record carrier and swinging the same from the turntable to the rack, there is provided a cam 71 fixed on the cam shaft 13, and a pivoted arm 72 pivoted at one end to a fixed support and carrying intermediate its ends a cam follower 73. The outer end of the arm 72 is operatively connected with the lower end of a vertical rod 74, the upper end of which is rigidly attached to the slotted plate 68. The connection between the rod 74 and the arm 72, comprises a yoke which is preferably in the form of a U having slots 75 which engage a transverse pin 76. The cam 71 has two depressed portions, which provide for a releasing action of the jaws 62 and 63, twice during a single revolution of the cam, or while the turntable is in operation to reproduce a record, and while the record rack is being lifted. A vertical movement of the rod 74 will therefore cause the end of the link 67 to be moved longitudinally, and thereby draw the clamps 62 and 63 together.

After the record on the turn-table has thus been engaged by said clamps, it is first lifted a short distance above the table. This is accomplished by lifting the record carrier by means of a cam 77 which coöperates with the pivoted arm 78 which carries a cam follower 79. The end of the arm 78 is also provided with a U-shaped portion having slots 80. The rod 74 passes through the tube or bushing 61, above referred to, and to the lower end of said bushing 61 is secured a gear 81 both of which rest upon a loose collar 82 on the rod 74, which collar 72 carries transverse pins 83 which engage the slots 80 in the end of the arm 78. A fixed sleeve 84, which projects downwardly from the plate 1, serves to hold the bushing 61 in position and forms a bearing therefor. Between the lower end of the sleeve 84 and the gear 81 is a coiled expansion spring which tends to depress said gear 81, and bushing 61, and also to keep the arm 78 in operative position in relation to the cam 77. Between the collar 82 and the lower end of the rod 74 is a coiled spring which tends to depress the arm 72, and also to keep its follower 73 in contact with the cam 71. Meshing with the gear 81 is a horizontally slidable rack 87 carried in the depending supporting post 88, and having at its inner end an enlarged portion provided with a longitudinal slot 89. Adjacent one end of said slot is fixed a follower which is adapted to engage a cam slot 91' in the face of the disk 91. It will now be



seen that as the cam 77 revolves, the arm 78 will be raised at intervals carrying with it the gear 81 and the sleeve 61. This will raise the record carrier arm 60 by reason of the fact that the same is attached to the bushing 61 at its upper end. When said arm has been raised, the rack 87 is then moved longitudinally by the movement of the follower 90 in the cam slot 91' in the disk 91. Longitudinal movement of the rack 87 will turn the gear 81, and consequently the sleeve 61 and the arm 60, until the latter comes over the requisite shelf or support of the record rack. The jaws then release the record after which the arm moves out of the path of the rack while the latter is being raised, to bring another shelf opposite the record carrying arm 60. The arm then moves over this shelf, the record is gripped by the jaws 62 and 63, and is carried by the arm 60 to a position above the turntable. The arm is then lowered and the turntable released, after which, reproduction of the record may begin.

One complete revolution of the cam shaft accomplishes all these operations and the cams are so designed that the parts will be accurately timed, and cooperate to produce the desired result.

The mechanism for raising and lowering the record rack (see Figs. 19 and 20) is actuated by a cam 92, which is located adjacent to or opposite a fixed vertical guide or support 93 for the record rack. The record rack comprises a vertical shelf bar 94, which is dovetailed in cross section, and fits within a similarly shaped groove in the support 93. The shelf bar 94 carries upon its narrow face a vertical plate or support 95, and a series of record shelves 96. Above each shelf is fixed a leaf spring 97 for the purpose of holding a record frictionally in position upon the shelf. Each of the shelves 96 is preferably substantially pear-shaped, provided at one side with a projection 98. These projections are arranged in vertical alinement and slidably engage a vertical post or rod 99, passing therethrough which serves as additional means for holding the shelves 96 in the requisite position, the shelves being allowed to slide vertically on said rod. Instead of the rod 99 for guiding the shelves of the record rack, a vertical guide 100, may be attached to the plate 1 of the casing of the apparatus, as shown in Figs. 1, 4 and 5. In this form of guide, of course the projections upon the shelves are omitted.

The shelf bar 94 is provided on one side with a series of ratchet teeth 101, and the support 93 is provided at one side with a slot 102 to allow the free end of a suitable pawl 103 to engage said ratchet teeth. This pawl, pivoted at its other end to one end of a link 104, the other end of which is

pivoted to the fixed support 93, forming a toggle. The joint of the toggle 103 and 104 is connected with the cam 92 by a pitman 105, which has in one end a slot 106 adapted to embrace the shaft 13. A spring 110 attached to the pitman 105 bears against the pawl 103 to keep the same normally in position in engagement with the teeth 101 of the rack 94. Upon one side of the pitman 105 is a cam follower 107, which, in connection with the cam 92, moves the pitman 105 longitudinally, and operates the toggle composed of the bars 103 and 104 to raise the rack bar 94.

To permit the rack bar and record magazine carried thereby to be lowered to its starting position, and also to allow any record to be selected or played the second time, a latch 108 is provided, which is pivoted to the rack support 93, and which is adapted to engage a pin 109 carried on the pawl 103. By manually moving the latch 108 away from the support 93, the pawl 103 will be withdrawn from engagement with the teeth of the rack bar 94. This will allow the record rack to be lowered or placed in any desired position, so that any record contained in the rack may be reproduced as desired.

The parts thus far described constitute one form of a complete operative device, but of course it is obvious that the same may be modified in many ways, so that the same result may be produced, for instance the record carrier may be simplified and constructed in the form shown in Figs. 10, 11, 12, 13, 14, and 15. This modified form of record carrier comprises an arm 60, which is attached to a sleeve 61, as before described, and two jaws 62 and 63 are slidably mounted upon said arm 60 as hereinbefore described. In this case, however, only one jaw 63 is positively operated, the other jaw 62 being held yieldingly in position by a compression spring 111, which is fixed at one end to the underside of the arm 60. The jaw 63 is positively operated by being connected to a longitudinally movable link or pitman 112, by means of screws 113, which pass through a suitable slot in the arm 60, and by a spring 63', which tends to draw said jaw 63 outward. The inner end of the pitman 112 is pivotally connected to one arm of a bell crank lever 114, which is pivoted to an extension 115 on the sleeve 61. The inner arm of the bell crank lever 114 projects through a slot in the sleeve 61, and contacts with the upper end of the vertical rod 74. In this form the cam, previously indicated by the numeral 77, and the arm 78, are made unnecessary, and the cam 71 and arm 72 perform the function thereof in connection with the parts last above described. All the other features of the mechanism for lifting the record carrier, and



turning the same upon its vertical axis, being the same as the corresponding parts previously referred to in connection with the first form.

5 In this modified form of a record carrier, however, when the arm 72 is raised by the cam 71, the vertical rod 74 is first raised against the action of the spring 86. This operates the bell crank lever 114, and  
10 draws the jaw 63 inward so as to clamp the record between said jaw and the jaw 62. As the cam 71 continues this movement, and raises the arm 72 still farther the vertical rod 74 will force the inner arm of the bell  
15 crank lever 114 against the cap 116, which covers the end of the sleeve 61. This sleeve 61, together with the parts attached thereto, will then be raised, thus removing the record from the turntable. The cam 91 then  
20 comes into action through the rack 87, rotates the gear 81 and the sleeve 61, to which said gear is attached, to swing the record carrier to its position over the record rack in a manner exactly similar to that herein-  
25 before described.

The operation of this improved automatic talking machine is as follows: Supposing the sound box to be in position adjacent the outer margin of the record on  
30 the turntable 3, the stylus or needle having its point in place in the record groove and the parts of the mechanism for controlling the reproducing devices being in the position indicated in Fig. 18; and also supposing that  
35 the parts are all at rest and that the brake shoe 11 is in contact with the turntable 3, by reason of the position of the cam nut 25; it is then only necessary to turn the said nut 25 manually so that the brake shoe will  
40 be allowed to be withdrawn from contact with the turntable by the spring 12 acting upon the brake lever 9. The turntable will then revolve in the usual manner, and the needle will traverse the whole width of  
45 the record until the reproducer arm comes in contact with the projection or stop 28 carried by the arm 27. This will release the latch or lug 31, and thereby turn the shaft 30, which moves the rod 33 longitudinally  
50 toward the right as shown in Fig. 18. The longitudinal movement of the rod 30 acts upon the pin 40, and thereby raises the arm 38 out of the notch in the cam 41, and also releases the arm 43 so that the cam motor is  
55 allowed to rotate the shaft 13 and all of the cams carried thereby.

It will be seen, at this point, the record carrier and record rack operating mechanism are thrown into operation, but before  
60 continuing to a description of such mechanism the action of the mechanism for operating the reproducer and parts connected thereto will be continued with. As the cam 14 has now been started by the cam motor

so as to revolve in anti-clockwise direction, 65 as shown in Fig. 18, the lever 16 will be oscillated and its outer end raised. This will raise the vertical rod 19, and, consequently, the arm 22, which will then contact with and raise the reproducer arm 23, shown by 70 dotted circle in Fig. 16. The supporting arm 22 being inclined, the reproducer arm and parts will slide from the first position above mentioned toward the lower end of said supporting arm until arrested by con- 75 tact with the stop 28', which is so adjusted as to place the stylus of the sound box or reproducer above the beginning or outer end of the record groove.

As the cam 14 continues to revolve, the 80 sound box is still held at a sufficient distance above the record to allow the said record to be removed and another one placed in position upon the turntable, and the sound box is not again lowered until the follower 15 85 again enters the notch in the cam 14, during which time the changing of the record has been completed.

Now returning to the point at which the cam shaft is first started, it will be seen that 90 as the cam 41 is rotated the follower arm 38 will be maintained in its raised position by reason of its contact with the portion of the cam adjacent the pin 46. This will keep the arm 42 out of contact with the projecting 95 arm 43 on the governor shaft 44 until the notch has again allowed the follower arm 38 to drop. Meanwhile, the pin 46 has been rotated with the cam 41, and almost immediately after starting contacts with the lower 100 end of the swinging arm 35. This moves the rod 33 in the opposite direction to that above described, or in other words, from right to left, as shown in Fig. 18. This 105 forces the lug 31 past the latch 27', thereby setting stop 28 in such position as to be ready for another contact with the reproducer arm 23. In this manner it is seen that after the cam motor is once started, the starting mechanism is immediately reset, 110 while the motion of the cams themselves permits the motion of the cam motor until the follower arm 38 drops into the notch in the cam 41.

When the cam shaft 13 begins to rotate, 115 and while the operations last above described are taking place, the record carrier is being operated to transfer the record just used from the turn table to the correct shelf in the record rack, and to substitute another 120 record therefor on the turntable. When not in use the record carrier arm 60 is in the position shown in Fig. 4, that is, at one side of the center of the turntable so as to allow the sound box or reproducer to have a free 125 path along a radius of the record. The first motion of the arm 60 therefore is to be moved so that the same is brought to a stop above



the diameter of the record. This is accomplished by the shape of the cam groove 91' in the cam 91, and particularly shown in Fig. 22, immediately adjacent the dotted circle indicating the follower 90.

At this point the record carrier arm 60 is at rest for a short time while the jaws 62 and 63 are moved to engage the record disk. This is accomplished by the connection between the arms 72 and said jaws, as above described. As the follower 73 on the arm 72 is raised, the jaws are first moved toward each other and then a continued motion of the follower 73 onto the larger arch-shaped surface of the cam 71, together with the upward movement of the sleeve 61 caused by the follower 79, moving onto the outer arch-shaped surface of the cam 77, lifts the arm 60, together with the record disk.

At this point the arm 60 is swung around in the direction of the record carrier, by reason of the movement of the follower 90 in the cam groove 91' until the record is brought above its shelf. The jaws 62 and 63 are then made to disengage from the record, and the record arm is swung out of the path of the record rack, which is then raised one notch by reason of the cam 92 then coming into action to operate the pawl 103. The carrier arm is then returned to position within the record rack above the next record disk, which is immediately gripped by the jaws 62 and 63, and removed from the rack and placed upon the turntable in a manner just the reverse of that above described in removing the record from the turntable. At this point the sound box and other reproducing parts are lowered by reason of the follower 15 entering the notch in the cam 14, and the cam motor is stopped by reason of the arm 38 entering the notch in the cam 41. The turntable motor is then started because the rod or post 19 has been lowered carrying with it the inclined projection 24 which allows the spring 12 to move the brake lever 9 so that the brake shoe 11 is disengaged from the turntable.

This succession of operations or movements is repeated until all the records carried by the rack have been reproduced, or until the eccentric nut 25 has been moved to force the brake shoe 11 permanently into contact with the turntable.

It is to be understood that this invention is not limited to the exact form and arrangement of parts herein described, since the same may be changed by the substitution of mechanical equivalents, by the modification of the construction or arrangement or the omission of some of the parts, by the addition of auxiliary devices, or by making other changes without departing from the spirit of the invention or the scope of the appended claims.

Having fully described this invention, I claim and desire to protect by Letters Patent of the United States:

1. A talking machine comprising a support for talking machine records, a magazine for holding talking machine records, and means for automatically clamping and moving a talking machine record from said magazine to said support.

2. A talking machine comprising a support for talking machine records, a magazine for talking machine records, and means for automatically gripping and moving a talking machine record from said magazine to said support and returning the same to said magazine.

3. A talking machine comprising a support for talking machine records, of actuating means therefor, a magazine for holding talking machine records, and means actuated by said actuating means for moving any one of said talking machine records selectively from said magazine to said record support.

4. A talking machine comprising a support for talking machine records, actuating means therefor, a magazine for holding talking machine records, and means actuated by said first mentioned means for moving any one of said talking machine records selectively from said magazine to said record support and returning the same to said magazine.

5. In a talking machine, the combination with a sound reproducer, of a record carrier, a receptacle for the records, and means actuated by the movement of said reproducer for starting the operation of said record carrier and record receptacle.

6. In a talking machine, the combination with a movable reproducing mechanism, of a record carrier, a storage receptacle for the records, a latch operated by the motion of said reproducing mechanism for starting the operation of said record carrier, and means for resetting said latch and means for stopping the operation of said record carrier and storage receptacle.

7. In a talking machine, the combination with a movable sound reproducer, a rotary record support and a motor for operating the same, of a record carrier, a storage receptacle coöperating therewith, a latch operated by the motion of said reproducer for starting the operation of said record carrier and storage receptacle, and means mechanically connected with said record carrier and storage receptacle for starting and stopping said motor.

8. In a talking machine, the combination with a rotary record support, of a motor therefor, a record carrier, a receptacle for records coöperating therewith, a sound reproducer, means actuated by said repro-

ducer for starting the operation of said record carrier and said receptacle, driving means for said record carrier and receptacle, and means connected with said driving means for stopping the operation of said motor.

9. In a talking machine, the combination with a rotary record support, of a motor therefor, a sound box, means for automatically raising and lowering said sound box, a record carrier, a record receptacle, means for operating said carrier and receptacle, means controlled by said sound box for starting said carrier and receptacle operating mechanism, and means operatively connected with said sound box for starting and stopping said motor for said rotary record support.

10. In a talking machine, sound reproducing mechanism, means for automatically operating said reproducing mechanism, comprising an inclined support, a cam operatively connected with said support, means controlled by the position of said reproducing mechanism for starting the rotation of said cam, and means for stopping the rotation of said cam.

11. In a talking machine, sound reproducing mechanism, means for automatically operating said reproducing mechanism, comprising an inclined support, a cam operatively connected with said support, means controlled by the position of said reproducing mechanism for starting the rotation of said cam, and means controlled by the rotation of the cam mechanism for stopping said cam.

12. In a talking machine, sound reproducing mechanism, means for automatically operating said reproducing mechanism, comprising an inclined support, a cam operatively connected with said support, a shaft upon which said cam is mounted, means for driving said shaft, a latch controlled by the position of said reproducing mechanism for starting the rotation of said cam, and means connected with said cam shaft for stopping the rotation of said cam.

13. In a talking machine, the combination with sound reproducing mechanism of means for automatically operating said reproducing mechanism, comprising a talking machine motor, a vertically movable support, means controlled by the position of said reproducing mechanism for raising and lowering said support, means for starting and stopping said talking machine motor operatively connected with said support, and controlled by the position thereof.

14. In a talking machine, sound reproducing mechanism, means for automatically operating said reproducing mechanism, comprising a talking machine motor, a vertically movable support, means for starting and stopping said talking machine motor, com-

prising a projection carried by said support and operatively connected with said motor.

15. In a talking machine, a turntable, sound reproducing mechanism, means for automatically operating said reproducing mechanism, comprising a vertically movable support, an inclined projection carried by said support, and a brake lever adapted to engage said turntable and to be oscillated by said inclined projection.

16. In a talking machine, a turntable, means for automatically placing the records upon and removing the same from said turntable, comprising a movable support, means carried by said support adapted to clamp the records, means for moving said support to and away from said turntable, and a receptacle adapted to receive the records when disengaged from said support.

17. In a talking machine, a turntable, means for automatically placing the records upon and removing the same from said turntable, comprising a movable support, jaws carried by said support, means for drawing said jaws together to engage the record, means for moving the said support vertically, means for moving said support laterally to and away from said turntable, and a receptacle adapted to receive the records when disengaged from said automatically operated means.

18. In a talking machine, a turntable, means for automatically placing the records upon and removing the same from said turntable, comprising a pivoted carrier arm or support, jaws carried by said arm, means for drawing said jaws together for engaging the records, means for moving said support to and away from said turntable, and a receptacle adapted to receive the records when disengaged from said support.

19. In a talking machine, a turntable, means for automatically placing the record upon and removing the same from said turntable, comprising a horizontal arm, jaws carried by said arm, means for causing said jaws to engage the record, a sleeve to which said arm is attached, a rod passing through said sleeve and forming part of means for operating said jaws, and a receptacle adapted to receive the records when disengaged from said automatically operated means.

20. In a talking machine, a turntable, means for automatically placing the records on and removing the same from said turntable, comprising a swinging arm, a sleeve to which said arm is attached, a rod passing through said sleeve, means carried by said arm for clamping the record thereto, said means comprising a jaw slidable longitudinally of said arm and being operatively connected with said rod, means for moving said rod, and a receptacle adapted to receive the records when disengaged from said arm.



21. In a talking machine, a turntable, means for automatically placing the records upon and removing the same from said turntable, comprising a swinging arm, a rotatable sleeve upon which said arm is mounted, a rod passing through said sleeve, means carried by said arm for engaging the record, said means comprising a jaw slidable upon said arm, connections between said jaw and said rod, means for moving said rod, means for rotating said sleeve, and a receptacle adapted to receive the records when disengaged from said arm.

22. In a talking machine, a turntable, means for automatically placing the record upon and removing the same from said turntable, comprising a swinging arm and a sleeve upon which said arm is mounted, a rod passing through said sleeve, means carried by said arm for engaging the record, comprising a jaw slidable upon said arm, connections between said jaw and rod, means for moving said rod vertically, and a receptacle adapted to receive the records when disengaged from said arm.

23. In a talking machine, a turntable, means for automatically placing the records upon and removing the same from said turntable, comprising a swinging arm, a sleeve upon which said arm is carried, a gear also carried by said sleeve, a longitudinally movable rack meshing with said gear, means for moving said rack to swing said arm, a vertical rod passing through said sleeve, means carried by said arm for clamping the record, connections between said rod and said clamping means, means for moving said rod vertically to clamp the record, means for moving said sleeve vertically to raise or lower said arm, and a receptacle adapted to receive the records when disengaged from said automatically operated means.

24. In a talking machine, a turntable, means for automatically supplying records to said turntable and removing the same therefrom, comprising a swinging arm, means on said arm adapted to clamp the record, a record rack having a series of compartments or divisions for the records, means for moving said rack to bring the divisions thereof successively opposite the record carrier, and means for swinging said carrier to and from said turntable into the divisions of said rack for swinging the same clear of said rack during the movement of said rack, and for swinging the carrier into said rack to engage another record.

25. In a talking machine, a turntable, means for automatically supplying the records to said turntable and removing the same therefrom, comprising a record carrier, a record rack coöperating therewith having a series of divisions for the records, a toothed bar attached to said rack, pawls engaging

said toothed bar, one of said pawls being pivoted at a fixed point, a toggle connected to the other of said pawls, and means for operating said toggle to raise the record rack.

26. In a talking machine, a turntable, sound reproducing mechanism, means for operating said reproducing mechanism to make the same active and inactive and to return the same to the starting position, a record carrier for clamping and placing records upon and removing the same from said turntable, a record rack or receptacle, a series of cams for operating said parts, a shaft upon which said cams are carried, means for rotating said cam shaft, and mechanism connected with said reproducing mechanism for throwing into action said rotating means, and means operated by the rotation of said shaft to stop said rotating means.

27. In a talking machine, a turntable, sound reproducing mechanism, means for operating said reproducing mechanism to make the same active and inactive in relation to the records, a record carrier for placing the records upon and removing the same from said turntable, a record rack or receptacle for the records, a series of cams operatively connected with said parts, a shaft upon which said cams are carried, means for driving said cam shaft, a governor connection with said driving means, a stop adapted to arrest the movement of said governor, connections between said stop and said reproducing mechanism, and means operated by said cam shaft to operate said stop to arrest the movement of said governor.

28. In an automatically operated talking machine, sound reproducing mechanism, a series of cams for operating the different parts, a shaft upon which said cams are carried, means for driving said shaft, a governor for said driving means, a stop for said governor, a latch adapted to be released by said sound reproducing mechanism to remove said governor stop, a cam carried by said shaft having a follower connected with said stop, said cam being adapted to move said stop to arrest the rotation of said governor.

29. In a talking machine, a turntable, sound reproducing mechanism, means for operating said reproducing mechanism to make the same active and inactive, a record carrier for placing the records upon and removing the same from said turntable, a record rack or receptacle, a series of cams for operating said parts, a shaft upon which said cams are carried, means for driving said cam shaft, a stop for arresting the motion of said driving means, and a latch connected with said stop and operated by the movement of said sound reproducing mechanism for removing said stop, a follower con-



nected with said stop and adapted to operate the same to arrest the motion of the driving means, and connections between one of said cams and said latch for resetting the same.

5 30. In an automatically operated talking machine, a motor, sound reproducing mechanism, cams for controlling the operation of the parts thereof, a cam shaft upon which said cams are mounted, driving mechanism  
10 for said shaft, a stop for said driving mechanism, connections between said reproducing mechanism and said stop adapted to remove the latter by the motion of said reproducing mechanism, cam operated means for resetting said stop, and cam operated means for  
15 controlling the action of the talking machine motor.

31. In a sound reproducing machine, the combination of a record support, a record  
20 thereon and rotated thereby and horizontally movable means for automatically lifting the record from the support, said means being also automatically moved to swing said record horizontally.

32. In a talking machine, the combination with a horizontal turntable, of a pivoted record carrier and support and means for swinging said carrier and support in a horizontal plane into and out of position over  
30 said turntable.

33. A machine comprising a magazine adapted to support a plurality of sound records, a rotary record support in proximity to said magazine, means to actuate said support, and means actuated by said actuating  
35 means to shift a record from the magazine to the support and then to return the record from the support directly to its original position in the magazine.

34. In a sound reproducing machine, the combination with a rotatable talking machine record support, of means for supporting a series of talking machine records, and means arranged to be operated to clamp and  
45 shift a talking machine record horizontally from the series to the support.

35. In a sound reproducing machine, the combination with a rotatable talking machine record support, of means for supporting a series of talking machine records, and means arranged to be operated to clamp and shift a talking machine record from the support to the series.

36. In a sound reproducing machine, the combination with a rotatable talking machine record support, of means for supporting a series of talking machine records, and means arranged to be operated to clamp and shift a talking machine record from the series to the support and from the support to the series.

37. In a talking machine, the combination with a talking machine record support, of means mounted upon the talking machine

structure for clamping a talking machine record and moving said record from said support.

38. In a sound reproducing machine, the combination with a rotatable talking machine record support, of a magazine for sounds records, means for automatically clamping and transferring a talking machine record from the magazine to the support, and for automatically clamping and transferring a talking machine record from the support to the magazine.

39. In a sound reproducing machine, the combination with a rotatable record support, of a sound reproducer, a magazine, means for automatically transferring a record from the magazine to the support and from the support to the magazine, and means controlled by the reproducer for automatically moving said reproducer out of operative position and simultaneously stopping the record support.

40. In a sound reproducing machine, the combination with a rotatable record support, of a magazine, means for automatically transferring a record from the magazine to the support and from the support to the magazine, and a brake engaging said support and automatically actuated to stop the rotation of said support during the transfer of records.

41. In a sound reproducing machine, the combination with a rotatable record support, of a magazine, and oscillatory means arranged to entirely support and to carry a record between said record support and said magazine.

42. In a sound reproducing machine, the combination with a rotatable record support, of rotating means therefor, a sound box and stylus, a magazine, means for automatically transferring a record from the magazine to the support and from the support to the magazine, and means for moving the stylus into and out of operative position, and means controlled by said sound box for automatically stopping said support substantially simultaneously with the movement of said stylus out of operative position and during the transfer of records.

43. In a talking machine, the combination with a rotatable record support and driving mechanism therefor, of a pivoted record carrier mounted to swing into and out of alignment with said record support and operatively connected to said driving mechanism.

44. In a talking machine, the combination with a substantially flat rotatable record support and driving mechanism therefor, of a record carrier adapted to form the sole support of a record pivoted to swing in a plane parallel to said support and actuated by said driving mechanism.

45. A talking machine comprising a turn-

table and driving mechanism therefor, a radial arm mounted to swing over said turntable, a sound box carried by said arm, an auxiliary driving mechanism and means mounted to reciprocate in a vertical line and actuated by said auxiliary driving mechanism for swinging said sound box vertically.

46. In a talking machine, the combination with a turn-table and driving mechanism therefor, of a pivoted record carrier, adapted to form the sole support of an auxiliary driving mechanism, and means actuated by said auxiliary driving mechanism for swinging said carrier.

47. In a talking machine, the combination with a turntable and driving mechanism therefor, of a record carrier pivoted to swing in a plane parallel with said turntable and arranged to form the sole support for a record, and means actuated by said driving mechanism for swinging said carrier.

48. A talking machine comprising a record support, driving mechanism therefor, an arm mounted to swing over said support, a sound box carried by said arm, and means thrown into operation by said driving mechanism for moving said sound box downwardly toward said support, said sound box being continuously under the control of said means while being moved toward said support thereby.

49. In a talking machine, the combination with a support for talking machine records, of a magazine adapted to hold a plurality of disk talking machine records, and means for automatically clamping and moving a disk talking machine record from said magazine to said support.

50. In a talking machine, the combination with a support for talking machine records, of a magazine adapted to hold disk talking machine records, and means for automatically clamping and moving a disk record from said support to said magazine.

51. In a talking machine, the combination with a support for talking machine records, of a magazine for holding disk talking machine records, and means for automatically clamping and moving a disk talking machine record from said magazine to said support and returning the same to said magazine.

52. In a talking machine, the combination with a support for talking machine records, of a magazine for holding disk talking machine records, and means for automatically clamping and moving a disk talking machine record from said magazine to said support and returning the same to its original position in said magazine.

53. In a talking machine, the combination with a rotary support for talking machine records, of actuating means therefor, a magazine for holding a plurality of disk

talking machine records, and means automatically actuated by said actuating mechanism for moving a record selectively from said magazine to said support.

54. In a talking machine, the combination with a rotary support for talking machine records, of actuating means therefor, a magazine for holding a plurality of disk talking machine records, and means automatically actuated by said actuating mechanism for moving a talking machine record selectively from said magazine to said support and for returning the same to said magazine.

55. In a talking machine, the combination with a rotary support for talking machine records, of actuating means therefor, a magazine for holding a plurality of disk talking machine records, and means automatically actuated by said actuating mechanism for moving a talking machine record selectively from said magazine to said support and for returning the same directly to its original position in said magazine.

56. In a talking machine, the combination with a support for talking machine records, of a magazine for holding talking machine records, means for transferring records from said magazine to said support, a motor for actuating said support, an auxiliary motor for actuating said record transferring means, and means whereby said first mentioned motor will automatically start said auxiliary motor.

57. In a talking machine, the combination with a support for talking machine records, of a magazine for holding talking machine records, means for transferring records between said magazine and said support, a motor for actuating said support, an auxiliary motor for actuating said record transferring means, and means whereby said first mentioned motor will automatically start said auxiliary motor, and whereby said first mentioned motor will be automatically stopped.

58. In a talking machine, the combination with a support for talking machine records, of a magazine for holding talking machine records, means for transferring records between said magazine and said support, a motor for actuating said support, an auxiliary motor for actuating said record transferring means, means whereby said first mentioned motor will automatically start said auxiliary motor, and whereby said first mentioned motor will be automatically stopped, and means whereby said auxiliary motor will be automatically stopped.

59. In a talking machine, the combination with a support for talking machine records, of a magazine for holding talking machine records, means for transferring records between said magazine and said support, a



motor for actuating said support, an auxiliary motor for actuating said record transferring means, means whereby said first mentioned motor will automatically start  
5 said auxiliary motor, and whereby said first mentioned motor will be automatically stopped, and means whereby said auxiliary motor will be automatically stopped and  
10 said first mentioned motor automatically started.

60. The combination with a talking machine including a record support, a sound box, and means for actuating the talking machine, of means for placing a record on  
15 or removing it from said support, a vertically movable supporting rail for the

sound box, means for automatically lowering the rail after the record has been placed upon the support, means for raising the rail to lift the sound box from the record after  
20 the record has been played to permit the removal of the record from the support, and means controlled by said sound box for automatically stopping the talking machine  
25 actuating means upon the raising of the rail.

In testimony whereof, I have hereunto set my hand this 25th day of October, A. D. 1904.

LOUIS P. VALIQUET.

Witnesses:

EDW. W. VAILL, Jr.,  
MAX BAYENDORFER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents Washington, D. C."



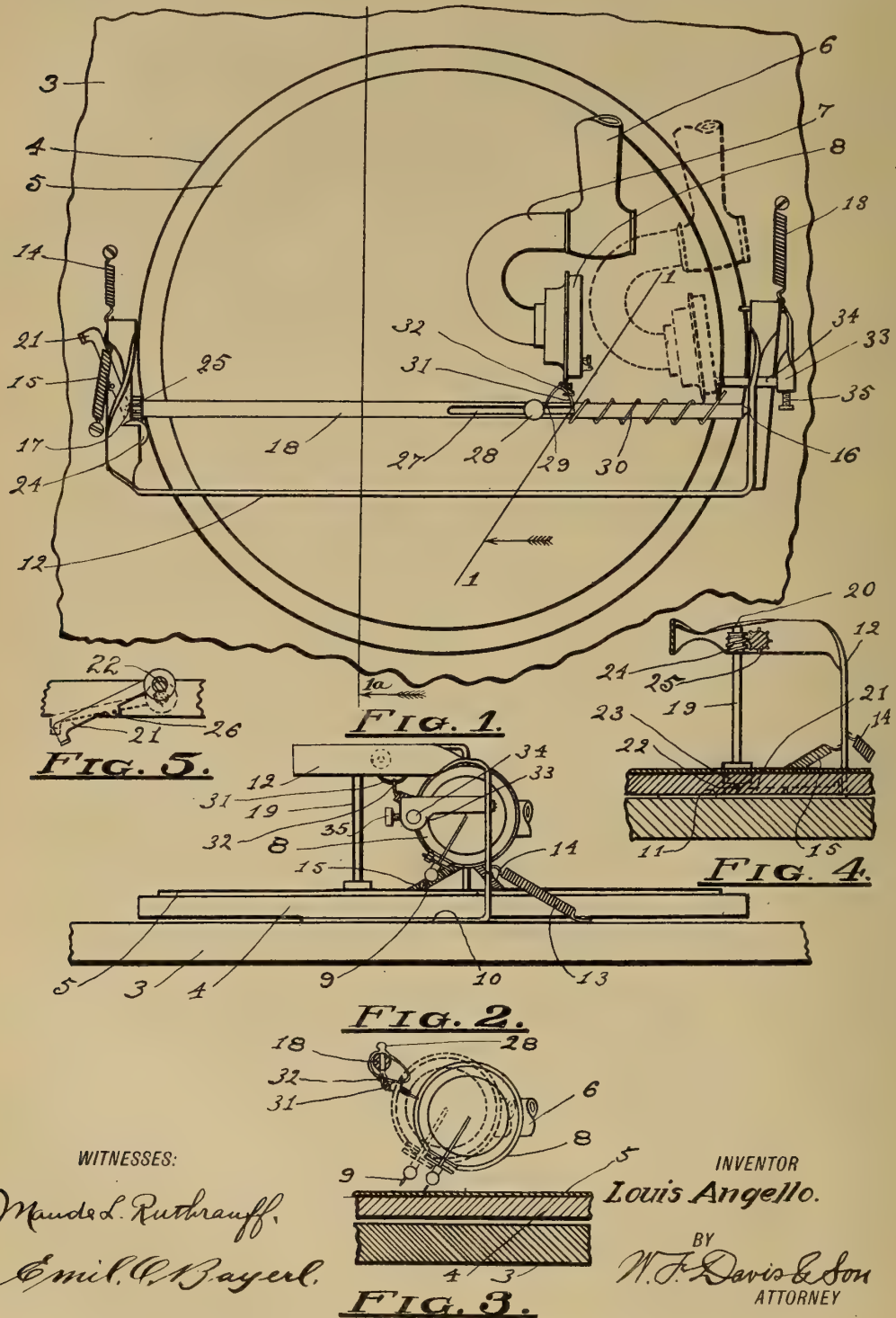
REPEATING ATTACHMENT FOR  
PHONOGRAPHS,

#1,224,995-----I. Angello,  
Patented-May 8th, 1917.  
Filed-March 23rd, 1916.

L. ANGELLO.  
 REPEATING ATTACHMENT FOR PHONOGRAPHS.  
 APPLICATION FILED MAR. 23, 1916.

1,224,995.

Patented May 8, 1917.



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# UNITED STATES PATENT OFFICE.

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REPEATING ATTACHMENT FOR PHONOGRAPHS.

1,224,995.

Specification of Letters Patent.

Patented May 8, 1917.

Application filed March 23, 1916. Serial No. 86,122.

*To all whom it may concern:*

Be it known that I, LOUIS ANGELLO, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Repeating Attachments for Phonographs; of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to a repeating attachment for sound reproducing machines and seeks to provide a simple and effective repeating attachment which may readily be employed in connection with the usual disk record sound reproducing machine.

Sound reproducing machines are frequently employed for playing music for entertainments, advertising purposes and in the home, and motors that will drive the machine continuously are common, but when each record is played the position of the contacting parts of the machine must be returned to the starting point which requires the services of an attendant, so that the machine will not play continuously without attention.

Repeating devices have been devised that require building in the machine, but these cannot be readily attached to the usual form of machine after the latter is constructed. It is essential that an efficient and inexpensive attachment be provided that may be attached to the machine that has been used so that any machine may easily be converted to a repeating machine, and so that the attachment may be removed when desired, it being undesirable for a machine to always repeat.

The present invention seeks to provide an improved repeating mechanism for sound reproducing machines that can readily be arranged on the usual disk record sound reproducing machine and lifted from the machine almost instantly when it is desired to discontinue its use.

With these and other objects in view, the invention consists in the features of construction, combinations and arrangements of parts hereinafter set forth, illustrated in the accompanying drawings and more particularly pointed out in the appended claims.

By employing an attachment that is easily placed upon the machine and as easily re-

moved therefrom, the usual machine is easily and effectually converted to a repeating machine and may as readily be reconverted to a non-repeating machine.

In the drawings:

Figure 1, is a fragmentary plan view of the usual disk record sound reproducing machine illustrating the connection of the improved repeating attachment, the latter being shown in plan view.

Fig. 2, is a fragmentary view in elevation of the sound reproducing machine, illustrating the connection of the reproducing attachment thereto.

Fig. 3, is a fragmentary sectional view taken on line 1—1 of Fig. 1.

Fig. 4, is a sectional view taken on line 1<sup>a</sup>—1<sup>a</sup> of Fig. 1.

Fig. 5, is a fragmentary plan view of the engaging and releasing lever of the mechanism.

The upper wall 3, disk 4, record plate 5, arm 6, connecting tube 7, incasement 8 and needle 9 are of the common and well known construction employed in disk record sound reproducing machines, commonly called phonographs.

Resting on the wall 3 at 10 and 11 is the bracket 12 which spans the disk 4 and it is held in operative position by the springs 13, 14 and 15, there being preferably no other means of securing the bracket to the plate.

Journaled in the bracket 12 at 16 and 17 is the shaft 18 the journal 17 being preferably a pointed or cone shaped bearing so that by springing the bracket slightly the shaft is easily removed and replaced in the position shown. The vertical shaft 19 is journaled in the bracket 12 at 20 and in the lever 21 at 22 and has rigidly mounted thereon the frictional contact wheel 23 and the worm pinion 24, the latter meshing with the worm wheel 25, the lever being pivoted at 26, and when the bracket 12 is properly located the lever in the position shown in full lines of Fig. 5 holds the wheel 23 in contact with the disk 4, while in the position indicated in dotted lines of Fig. 5 the lever holds the wheel out of engagement with the disk. When the wheel 23 is in engagement with the disk 4 the shaft 18 will revolve by reason of frictional contact with the disk and the shaft 12 is rotated through worm pinion 24 and the worm gear 25, this motion being continuous as long as the disk



is revolved, many disks being driven by electric motors for continuous playing.

The shaft 18 is provided with the slot 27 in which is mounted the binding screw 28 the latter securing the end 29 of the spiral spring shaped carrier 30, the carrier being otherwise freely mounted on the shaft. The carrier 30 is provided with the loop shaped projecting portion 31 in order to reach out from the shaft 12 and engage the hook 32 which projects from the incasement 8. This carrier 30 is of a larger internal diameter than the diameter of the shaft 18 and the loop 31 is so shaped as to space the carrier around and away from the shaft so that the hook 32 will pass between the inner surface of the carrier and the lower side of the shaft as the hook traverses the carrier. Secured in the bracket 12 at 33 is the adjustable plunger shaped stop bar 34 which is held in the desired position by the thumb set screw 35, the views representing a record plate 5 of a smaller diameter than the disk 4 which is the usual practice, it also being usual to employ record plates of a diameter equal to the disk, the plunger 34 being of sufficient range of adjustment to accommodate the employment of different size record plates, and being so adjusted as to contact with and stop the incasement 8 when the needle 9 has been carried to the outer edge of the operative diameter of the record disk.

The shaft 18 is sufficiently elevated so that when the incasement 8 reaches the position of full lines of Fig. 1 the projection 31 of the carrier 30 will engage the hook 32 and lift the incasement, lifting the needle 9 from the record plate 5, the hook continuing in engagement with the carrier and carrying the incasement to the position shown in dotted lines of Fig. 1. When the carrier will contract in length owing to its resiliency and disengage from the hook 32 allowing the incasement and needle to drop by gravity until the needle engages the record plate 5. It being understood that the projection 31 can be adjusted by the binding screw 28 so as to engage the hook 32 immediately on the needle 9 reaching the end of the record on the record plate 5, and that the plunger shaped stop bar 34 can be so adjusted as to stop the incasement 8 at a position that will place the needle 9 at the beginning of the record on the record plate.

It is obvious that different lengthed carriers 30 are provided to serve the different diameter of record plates and that the carrier can be made of an accurate length to suit the diameter of the record plate so that resiliency of the carrier will not be essential or advantageous. It is preferred however to employ a resilient carrier of a length that will slightly contract when the incasement 8 engages with the stop bar 34, thus avoiding accuracy of length in the carrier and allow-

ing a range of adjustment of the travel of the needle 9 as it is returned from the finishing to the starting position of the record on the record plate 5, it being well understood that disk records are played from near the periphery toward the center of the record plate.

The improved repeating attachment may easily be placed in position on the usual disk record sound reproducing machine and removed therefrom at will, and it affords an effective and inexpensive means of temporarily or permanently converting the usual phonograph to a continuous playing machine for entertainments, advertising purposes and the like.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a repeating attachment for disk record sound reproducing machines, a friction wheel, suitable supports for said friction wheel, said friction wheel being suitably constructed and arranged to contact with the outer edge of the disk of a sound reproducing machine, and mechanism driven by said friction wheel whereby the record disk contacting needle is returned to the starting position after traversing the record of the record plate.

2. In a repeating attachment for disk record sound reproducing machines, a shaft suitably arranged to span the disk of a disk record playing machine, whereby the record disk may be easily removed without disturbing the repeating mechanism, means to revolve said shaft, and means carried by said shaft whereby the machine is caused to repeat the playing of a record.

3. In a repeating attachment for disk record sound reproducing machines, a bracket suitably constructed to span a disk record, adjustable mechanism carried by said bracket whereby the machine is caused to repeat the playing of any size record, and said bracket and mechanism so arranged and located that the disk shaped record plates can easily be placed on and removed from the disk shaped platen of the machine without shifting or manipulation of said bracket or said mechanism.

4. In a repeating attachment for disk record sound reproducing machines, a shaft, a spiral carrier spaced away from and arranged around said shaft, means to drive said shaft, means to support said shaft, a hook arranged on a sound reproducer to engage with said spiral carrier, said carrier arranged to lift the hook and the disk contacting needle from the record plate at the end of the record on the plate and return the record contacting needle to the beginning of the record carried by the record plate, and said bracket and mechanism so arranged and located that the disk shaped records can easily be placed on and removed from the

disk platen of the machine without any shifting or manipulation of said bracket or said mechanism.

5 In a repeating attachment for sound reproducing machines, a disk shaped platen for receiving disk shaped record plates, a suitable sound reproducing mechanism movably mounted above said platen, a record plate contacting needle connected to said  
10 sound reproducing mechanism, a bracket spanning said platen and suitably supported on opposite sides of said platen, a shaft journaled in said bracket, suitable driving connections connecting said shaft and the  
15 periphery of said platen, a spiral carrier surrounding and spaced away from said shaft, a hook arranged on said sound reproducing mechanism to engage said spiral carrier, said spiral carrier being adjustable  
20 along said shaft, said spiral carrier being resilient so that it will automatically adjust to a distance shorter than the length thereof, and an adjustable stop for said sound reproducing mechanism whereby said sound re-  
25 producing mechanism is returned a shorter distance than the length of said carrier.

6. In a repeating attachment for sound reproducing machines, a bracket arranged to span the record member of a sound producing machine, a friction wheel arranged  
30 to be driven from the outer edge of the disk of the machine, a vertical shaft rigidly con-

nected to said friction wheel, a horizontal shaft journaled in said bracket, gears connecting said shafts, a spiral carrier surrounding and spaced away from said horizontal shaft, and a hook attached to the  
35 needle carrying member of the machine for the purpose of engaging said spiral carrier and returning the needle to the beginning of a record after the record has been traversed  
40 by the needle.

7. In a repeating attachment for sound reproducing machines, a revolving platen for carrying record plates, a bracket over  
45 said platen, a shaft journaled in said bracket, a spiral spring shaped carrier on said shaft, means to drive said shaft, a sound reproducing mechanism over said platen, a needle attached to said sound re-  
50 producing mechanism, a hook on said sound reproducing mechanism, one end of said spiral spring shaped carrier adjustably secured to said shaft, an adjustable stop for  
55 said sound reproducing mechanism, and said spiral spring shaped carrier being resilient so that it will become shorter in length when said sound reproducing mechanism  
60 strikes said stop whereby said needle is returned a distance less than the length of said spiral carrier.

In testimony whereof I affix my signature.

LOUIS ANGELLO.



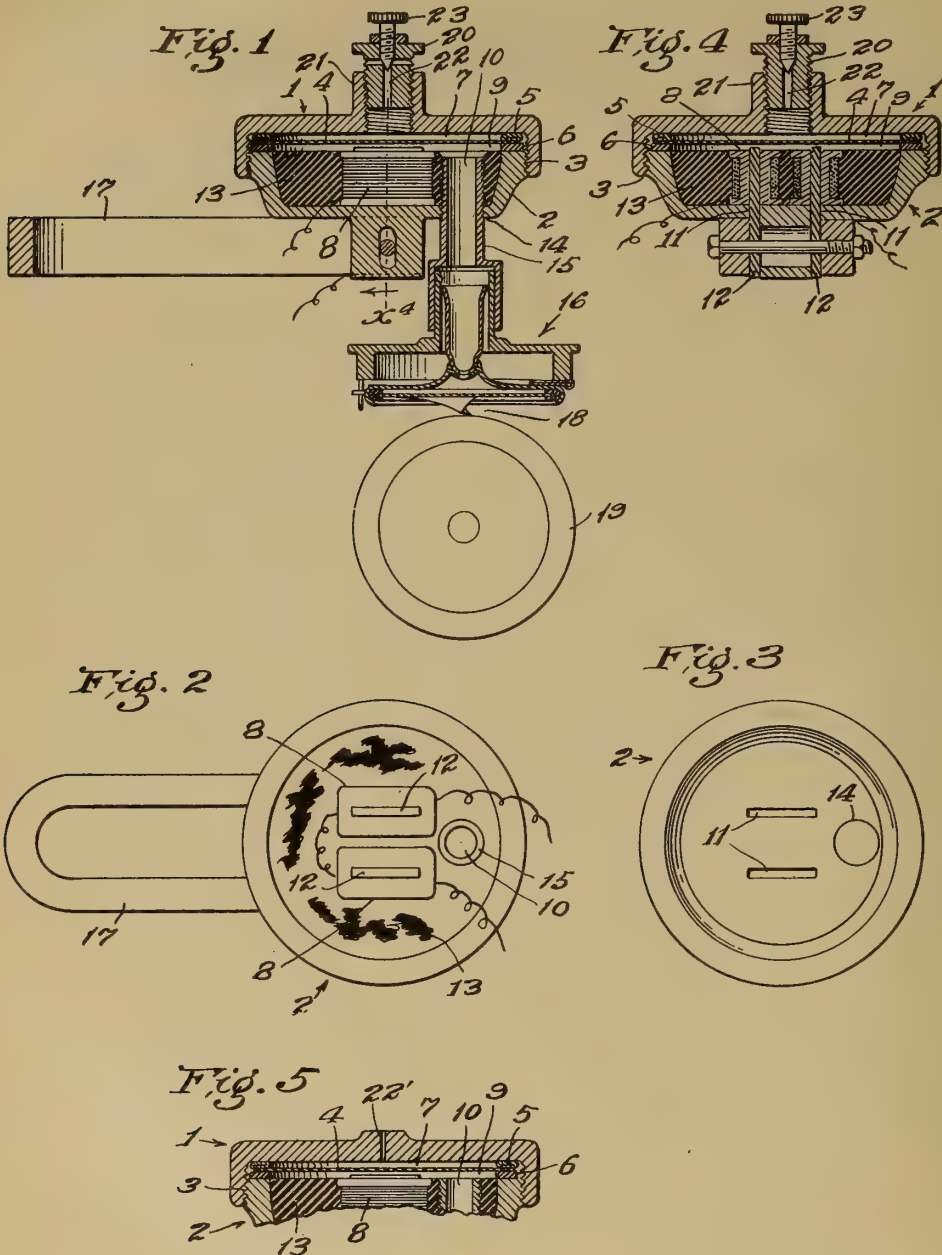


MEANS FOR UTILIZING ELECTRICALLY  
TRANSMITTED IMPULSES,  
#1,225,203-----E.H.Amet,  
Patented-May 8th, 1917.  
Filed-March 4th, 1916.

E. H. AMET.  
 MEANS FOR UTILIZING ELECTRICALLY TRANSMITTED IMPULSES.  
 APPLICATION FILED MAR. 4, 1916.

1,225,203.

Patented May 8, 1917.



Witness  
 C. C. Holly

Inventor  
 by Edward H. Amet  
 James R. Townsend  
 atty.

# UNITED STATES PATENT OFFICE.

EDWARD H. AMET, OF REDONDO BEACH, CALIFORNIA.

MEANS FOR UTILIZING ELECTRICALLY-TRANSMITTED IMPULSES.

1,225,203.

Specification of Letters Patent.

Patented May 8, 1917.

Application filed March 4, 1916. Serial No. 82,265.

*To all whom it may concern:*

Be it known that I, EDWARD H. AMET, a citizen of the United States, residing at Redondo Beach, in the county of Los Angeles and State of California, have invented a new and useful Means for Utilizing Electrically-Transmitted Impulses, of which the following is a specification.

This invention relates to the art of mechanically reproducing impulses and is particularly applicable to telephone receivers in general, and more particularly to a telephone receiver adapted to operate sound-recording devices, step-up devices and relays.

Heretofore it has been found impracticable to make a perfect sound record from a telephone receiver.

It has also been found impracticable to operate a step-up relay from the telephone receiver so as to accurately reproduce the original sound.

I have discovered that this is owing to the reversal of stress and reflex action set up in the telephone receiver and to over-vibration transmitted to the recording style or to the step-up device or relay as the case may be. That is to say, I have discovered that the unsatisfactory results obtained by using an ordinary telephone receiver in connection with the recording device of a talking machine for producing a record of telephonically transmitted sound-waves, arise from the fact that heretofore the telephone receiver diaphragm, which receives its stress when attracted toward the actuated electromagnet, has been arranged in opposition to the talking machine recording diaphragm and therefore its electrically caused action produces an outward or retractive motion of the talking machine recording diaphragm relative to the record groove during the period of stress upon the telephone receiver diaphragm, thus lifting the recording style and retracting it from instead of driving it into the record device. Such operation is the opposite of that of making a sound record upon the sound-recording cylinder or disk, or other sound record device, directly from the original sound waves as is generally practised in making sound records. In other words, I have discovered that in attempts heretofore made to produce a sound record by means actuated by a telephone receiver a push of the telephone receiver is expended in retracting the record style

from, instead of impressing it into the material of the record device; thus operating in direct opposition to the original impulses delivered to the telephone transmitter connected with such receiver, and that this operation produces a negative or reverse record of the minimum stress or reflex action of the telephone receiver diaphragm, thus preventing the production upon the record device, of a true record of the electrically-transmitted impulses.

An object of this invention is to provide for practically true mechanical reproduction of electrically-transmitted mechanically-produced impulses such as sound-waves and the like.

My newly-discovered method of utilizing electrically transmitted wave impulses includes subjecting a telephone receiver diaphragm to the action of an electro-magnet operating under the action of such impulses, cushioning one side of the diaphragm by an air cushion or the like, and collecting impulses from the other side of the diaphragm.

The impulses so collected may then be applied by suitable means as an air tube or passage or the like to the desired service; and may be employed through the recording mechanism of a talking machine recording apparatus, to produce a true record of the electrically-transmitted impulses.

Objects of this invention are to provide a telephone receiver for effecting superior articulation; to secure greater accuracy in the reproduction of telephonic impulses; and to provide a practical talking machine recorder and step-up relay telephone receiver.

An object is to produce a telephone receiver that will so operate a talking machine recording device as to produce a practically perfect record, from which practically perfect reproduction of the human voice and other sounds and noises may be made; and whereby it is made possible to perfectly record telephonic messages, through the medium of any form of sound-recording device at present known to me.

A principle of this invention which I regard as broadly new and basic is the cushioning of the telephone receiver diaphragm by means having minimum inertia and momentum. This is carried out by making the diaphragm the movable member of a properly proportioned air chamber so as to produce an efficient dash-pot whereby the move-



ments of the diaphragm acting upon the air inclosed within the dash-pot will tend to make the diaphragm dead-beat, thus giving an impulse to air in the impulse collecting chamber corresponding to the motion of the diaphragm without any over-sustained tone. That is to say, the overtone which would be set up by the diaphragm undamped, is practically eliminated, so that the sound represented by the electrical impulses is accurately reproduced.

I regard this invention as broad and basic in that I provide means for damping a telephone receiver diaphragm, which means consists of a dash-pot the movable wall of which is formed by the diaphragm to be damped. That is to say, I provide at one side of the diaphragm an air dash-pot formed by a practically closed, or, in other words, a nearly closed air chamber in which the diaphragm acts as the dash-pot piston.

In order that said air chamber shall operate as a dash-pot to damp the diaphragm the chamber is made of a limited size having a determined relation to the impulses received by the diaphragm; said chamber containing a proportionate volume of air adapted to produce a dash-pot action upon the diaphragm by both pressure and vacuum created by movement of the diaphragm and in due proportion thereto, thus damping the diaphragm action and preventing over-vibration of the diaphragm as the same is actuated by the electro-magnets.

The invention may be adapted in various ways to usual telephone receiver constructions; and preferably the device is constructed with an air dash-pot, of which the receiver diaphragm constitutes the moving member; there being an impulse collecting chamber with impulse outlet therefrom arranged on the side of the diaphragm opposite to the dash-pot chamber.

The impulse outlet in all instances must be on the side of the diaphragm opposite to the dash-pot chamber, but the electro-magnet of the receiver may be on either side of the diaphragm relative to the outlet.

Preferably the electro-magnet and the impulse outlet are on the same side of the diaphragm in order that the impulse through the outlet may correspond in direction to the impulse of the magnet; that is to say, it is preferable in all instances and necessary in most instances that the positive and reflex action of the impulses through the outlet shall be produced respectively by the positive and reflex actions of the telephone receiver diaphragm. In other words, it is preferable that the diaphragm, when attracted by the magnet, shall effect a compression of the air in the chamber having the outlet; and that the reflex action of the diaphragm shall reestablish the normal pressure.

I do not confine myself to any specific construction and shall illustrate the invention as applied with an air dash-pot on the side of the diaphragm opposite to the electro-magnet and a collecting chamber and impulse outlet on the same side of the diaphragm with the electro-magnet.

An object of this invention is to produce a telephone receiver which will impart to a talking machine recording means an impulse corresponding in stress and reaction to the atmospheric sound wave impulses actuating the electrical transmitter that is in operable connection with the telephone receiver.

Other objects and advantages may appear from the annexed drawings and the subjoined detail description and claims.

The accompanying drawings illustrate the invention.

Figure 1 is a mid-sectional elevation of a talking-machine recording telephone-receiver constructed in accordance with this invention and applied to the work of making a talking machine record from electrically transmitted impulses.

Fig. 2 is a plan of the device shown in Fig. 1 omitting the dash-pot side of the housing and some well known parts.

Fig. 3 is an inside view of the impulse collecting and outlet side of the housing detached.

Fig. 4 is a section on line  $x^x$ , Fig. 1, looking in the direction of the arrow.

Fig. 5 is a fragmental section analogous to Fig. 1 showing the construction with dash-pot of pre-determined size, having a fixed air vent.

The telephone receiver comprises a housing preferably constructed of two members as shown, there being a cushion- or dash-pot-forming side or cap 1 and an impulse-chamber-and-outlet-forming side 2 detachably secured together by any suitable means as by the threaded portions 3.

A diaphragm 4 is secured in the housing by any suitable means as by rubber gaskets 5, 6, compressed between the members 1, 2, and arranged at the rim of the diaphragm and supporting the same, so that the diaphragm is free to move; said gaskets being clamped between the housing members 1, 2, so that the diaphragm is yieldingly held by a non-resonant support formed by the compressed rubber gaskets 5, 6.

The diaphragm and the housing member 1 form the dash-pot chamber 7 on one side of the diaphragm. The usual telephone receiver electro-magnet 8 is located on the other or second side of the diaphragm; there being an impulse chamber 9 on the side of the diaphragm opposite to the dash-pot.

There is provided from said impulse chamber 9 an impulse outlet 10; and the electro-magnet and impulse chamber are preferably arranged on the same side of the dia-



phragm therewith, so that in responding to the impulse of the electro-magnet, the diaphragm will operate under the direct control of the dash-pot, and the impulses from the diaphragm, as set up in the impulse chamber, will be in the direction of and will accord in direction, duration and relative intensity with the impulses received by the diaphragm.

The member 2 is preferably made of sufficient depth to accommodate the two members of the electro-magnet 8 and is provided with orifices 11 to receive the electro-magnet stems 12, and after the electro-magnets are mounted in said member 2 the cavity of the member is filled with a wax or other suitable filling 13.

The member 2 is provided with an orifice 14 to receive an impulse outlet pipe 15 which is a hollow tube and is screwed into the opening 14. The outlet conduit 10 may be formed in any desired way through the wax filling and communicates with the bore of the pipe 15. Said pipe 15 forms a connecting medium between the member 2 and the talking machine recording means 16 that may be of any approved construction. An ordinary phonograph recording means is shown in this instance.

The permanent magnet 17 is connected with the members of the electro-magnet 8 and the member 2 in the usual way; and the style 18 and its connections are of the usual construction. The record device 19 may also be of any approved construction.

In the drawings I have shown the dash-pot chamber 7 regulable in capacity by an adjustable screw plug 20; screwed into a hollow boss 21 of the member 1 and provided with a vent 22 closed by a screw 23 so that in the form shown the internal dimensions of the chamber 7 may be adjusted by screwing the plug 20 while the vent 21 is open so that the normal pressure inside the chamber will be atmospheric pressure. Then the screw 23 may be screwed into the vent 22 thus nearly sealing the dash-pot chamber 7. In practical manufacture, however, it is assumed that the internal dimensions of the chamber 7 when once established for a determined diaphragm will not require adjustment or regulation; and in that case the cover is nearly closed and the regulating plug 20 is omitted as shown in Fig. 5.

In a sound recording device actuated by a receiver of the type shown in the drawings, the telephone receiver diaphragm operates the diaphragm of the talking machine recording device in the same manner and direction as the atmospheric sound waves would operate the same in making a primary or original record.

The dash-pot chamber 7 in Figs. 1, 4 and 5 is drawn to practical working proportions which I have determined by an operative

telephone receiver constructed in accordance with this invention and operated in connection with a talking machine recording device, and in which the dash-pot chamber was about 1/16 inch deep from face of diaphragm to inside wall of the cover, the depth of the impulse chamber 9 around the magnet being about the same as that of the dash-pot and the magnet being spaced from the diaphragm as in usual practice.

The cubic capacity of the dash-pot chamber to a practical working limit is such that the action of the diaphragm will produce pressure and vacuum upon the air volume in the dash-pot chamber sufficiently to practically dampen the movements of the diaphragm.

The permanent air vent 22' in the dash-pot chamber of Fig. 5 is of limited size proportioned to the maximum movement of the diaphragm and is for the purpose of relieving pressure and vacuum impulses alike and preventing confined air or muffled action without impairing the dash-pot action.

In practical operation the impulses of the electrically operated diaphragm are imparted to the air in the impulse chamber and transmitted through the medium thereof and the air in the outlet 10 to the usual talking machine recording means 16, which operates the style 18 to produce the record of the recording device 19.

The style 18 will thus be operated directly in synchronism with the telephone receiver diaphragm to-and-fro movement.

The recording device style 18 is thus operated in the same direction as the telephone receiver diaphragm, and with corresponding stress.

I claim:

1. The combination with a telephone receiver diaphragm and electro-magnetic means for operating said diaphragm, of dash-pot forming means containing air open to atmospheric pressure, means to regulate the size of the chamber, and means to nearly close the opening to the atmosphere.

2. A telephone receiver comprising a housing and a diaphragm mounted therein, said housing and diaphragm forming a dash-pot, of which the diaphragm constitutes the movable member, an electro-magnet in operable relation to the diaphragm, a collecting chamber and an outlet therefrom on the same side of the diaphragm with the electro-magnet.

3. A telephone receiver comprising a housing; a diaphragm in the housing, said housing and diaphragm forming a dash-pot chamber on one side of the diaphragm; an electro-magnet on the other side of the diaphragm, there being an impulse chamber on the same side of the diaphragm with the electro-magnet and an impulse outlet from said impulse chamber.

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4. The combination with a telephone receiver electro-magnet, of a diaphragm in operable relation thereto, a housing inclosing the diaphragm and forming a practically closed air chamber on the side thereof opposite the electro-magnet and also forming a second air chamber on the same side with said electro-magnet, and an impulse outlet from the second air chamber.

5. In a telephone receiver comprising a diaphragm, an electro-magnet, a collecting chamber and an impulse outlet all on the same side of the diaphragm, a dash-pot chamber on the side of the diaphragm opposite to the electro-magnet.

6. In a telephone receiver comprising a diaphragm, an electro-magnet and collecting chamber; an impulse outlet on one side of the diaphragm, and a dash-pot on the side of the diaphragm opposite to the electro-magnet.

7. In a telephone receiver comprising a diaphragm and an electro-magnet and collecting chamber, an impulse chamber and

outlet on the same side of the diaphragm with the electro-magnet; air dash-pot means in opposition to the electro-magnet to damp over-vibration of said diaphragm.

8. The combination with a telephone receiver diaphragm and electro-magnetic means for actuating said diaphragm, of means to form a dash-pot chamber on one side of the diaphragm, said means being provided with an air vent of limited size proportioned to the maximum movement of the diaphragm and adapted to relieve pressure and vacuum impulses alike and prevent confined air or muffled action without impairing the dash-pot action, the diaphragm being open to the atmosphere on the other side.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 28th day of February 1916.

EDWARD H. AMET.

Witness:

JAMES R. TOWNSEND.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



STOP MECHANISM FOR PHONOGRAPHS,  
#1,225,217-----W.R.Boyer,  
Patented-May 8th, 1917.  
Filed-May 18th, 1916.

W. R. BOYER.  
STOP MECHANISM FOR PHONOGRAPHS.  
APPLICATION FILED MAY 18, 1916.

1,225,217.

Patented May 8, 1917.

FIG. 1.

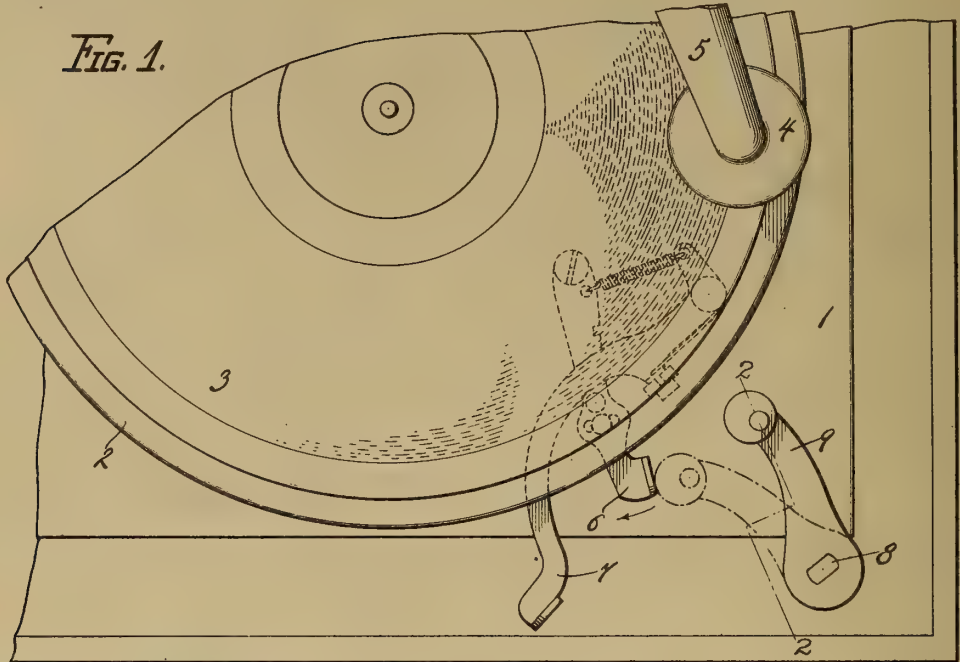


FIG. 2.

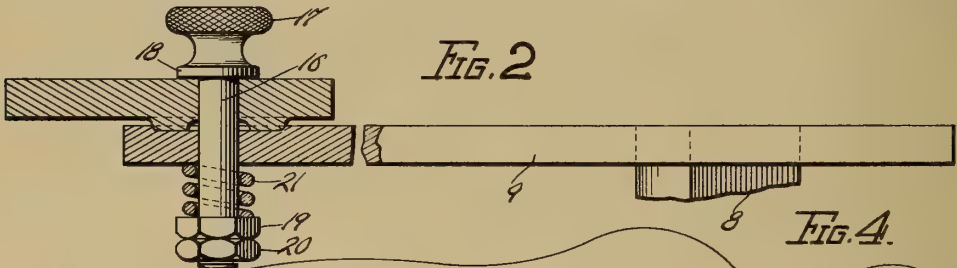


FIG. 3.

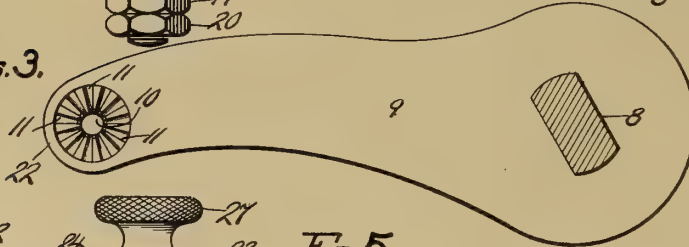


FIG. 4.

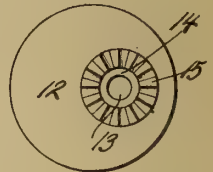
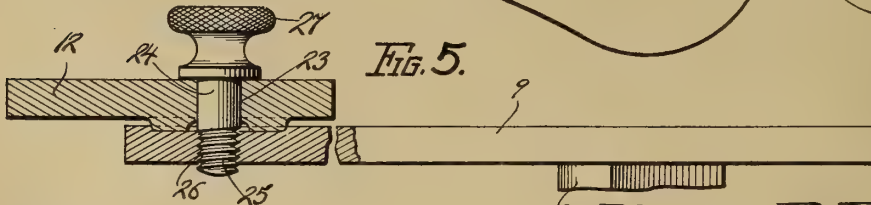


FIG. 5.



Witnesses

H. P. Harwood  
C. R. Ziegler.

Inventor

William R. Boyer.

By

Joshua R. H. Kottke.  
His Attorney

# UNITED STATES PATENT OFFICE.

WILLIAM R. BOYER, OF PHILADELPHIA, PENNSYLVANIA.

## STOP MECHANISM FOR PHONOGRAPHS.

1,225,217.

Specification of Letters Patent.

Patented May 8, 1917.

Application filed May 18, 1916. Serial No. 98,242.

*To all whom it may concern:*

Be it known that I, WILLIAM R. BOYER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Stop Mechanism for Phonographs, of which the following is a specification.

My invention consists of improvements in stop mechanism for phonographs or other talking machines, and is particularly serviceable for use on talking machines which employ disk records for the reproduction of sound.

My invention consists primarily of an improved form of stopping device which actuates automatically to stop the operating mechanism of a talking machine when the record has been reproduced, and thereby prevents the rotation of the record after the record has been reproduced.

One object of my invention is to so construct a device of the above described type which may be adjusted so as to automatically stop the mechanism of a talking machine after the record has been reproduced, the adjusting means being such as to be capable of variation to suit records of different sizes or which require different lengths of time to reproduce.

Another object of my invention is to so construct my improved stopping device that it may be easily and quickly adjusted to stop any sized record at the proper time which is at the conclusion of the reproduction.

A still further object is to so make my improved device that it will be durable and can be manufactured at a small cost.

A further object is to so construct my invention that it may be applied to machines now on the market without changing the construction of said machines.

These objects, and other advantageous ends which will be described hereinafter, I attain in the following manner, reference being had to the accompanying drawings in which—

Figure 1 is a top plan view showing sufficient of a talking machine to illustrate my invention.

Fig. 2 is a sectional view on the line 2—2 of Fig. 1 drawn on an enlarged scale.

Fig. 3 is a top plan view of an actuating arm which I employ.

Fig. 4 is an inverted plan view of an eccentric disk or plate which forms a part of my invention, and

Fig. 5 is a sectional elevation of similar nature to that shown in Fig. 2, but showing a modified form of my invention.

Referring to the drawings, 1 is a cabinet having therein mechanism (not shown) for rotating a turn table 2, upon which the record disk 3 is positioned. A sound box 4 having a member which engages the grooves in the record 3 to reproduce the sound thereof in the usual manner, is secured on the end of a horn or tube 5.

A stopping lever 6 and a starting lever 7 are mounted on the top of the cabinet 1, and these levers may be connected in any manner desired with mechanism so that when the lever 6 is pushed in the direction of the arrow shown in Fig. 1, the mechanism will be stopped and when the lever 7 is actuated, the mechanism will again be started.

These elements as above described are common to machines now on the market, and do not form a part of my invention, since my invention may be used in connection with any lever which when pushed will operate to stop the mechanism of the machine. Also, on certain machines now on the market, a shaft 8 is employed, and this shaft 8 is connected by mechanism so that a movement of the horn or tube 5 inwardly toward the center of the record effects a rotary movement of said shaft 8, and a single lever is ordinarily connected to this bar 8 and designed to contact with and move the lever 6 after the horn and sound box has moved inwardly toward the center of the disk a pre-determined distance.

Instead of providing a solid or single piece lever on the shaft 8, I provide an arm 9 which is secured to the shaft 8, and so form the end of this arm 9 as to provide a hole 10 and a series of grooves 11 which are radially disposed from the hole 10.

A disk or plate 12 has a hole 13 and said hole is made eccentrically to the center of said disk 12. This plate 12 is provided with an annular recess 14 and a series of ribs 15 which are radially disposed around the hole 13 and recess 14.

The ribs 15 are of such size as to engage the grooves 11 of the arm 9 and the holes 10 and 13 of the arm 9 and 12 respectively



will, when the ribs 15 of the said plate 12 are within the grooves 11 of said arm 9, be in alinement.

A pivot bar 16 extends through these holes 10 and 13 and has a thumb nut 17 secured to it, and this nut 17 is provided with a flange 18 designed to engage the upper surface of the disk 12. As shown in Fig. 2 of the drawing, the pivot bar 16 is directly secured to the disk 12, either by soldering or in any other manner, so that when the pivot bar 16 is turned, the disk 12 will also turn. The lower end of the pivot bar 16 is threaded and provided with two nuts 19 and 20, and a spiral expansion spring 21 surrounds the pivot bar 16 and bears on the lower surface of the arm 9 and the upper surface of the nut 19.

The nut 20 serves to act as a check or lock to prevent the nut 19 becoming loose. The spring 21 normally acts to keep the ribs 15 of the disk 12 within the grooves 11 on the arm 9, so that the disk 12 will not rotate. However, since the pivot bar 16 is free to move within the hole 10 of the arm 9, if the thumb nut 17 is raised so as to compress the spring 21 and to move the ribs 15 out of the grooves 11, the disk 12 may be rotated by turning the thumb nut 17, and as the disk 12 is eccentrically mounted, a greater or less portion of the disk 12 may be made to extend beyond the end 22 of the arm 9.

It will thus be seen from Fig. 1, that by having the disk 12 in such position as to engage and move the lever 6 and also by mounting the eccentric 12 as just described, the lever 6 may be actuated at different movements of the arm 9. For example, if the disk 12 is so turned that the greatest portion overlaps the end 22 of the arm 9, the arm 6 will be moved sooner than if the disk was so turned as to have a smaller portion extending over the end 22 of the arm 9, even though it is considered that the shaft 8 rotates at the same speed in both instances. From this it will be seen that the disk 12 may be made to operate the lever 6 at different times during the inward travel of the sound box 4 toward the center of the disk, and by so gaging the position of the disk 12, the mechanism may be stopped at the conclusion of different sized records.

The operation of my device is as follows:

After the record has been placed upon the turn table 2, the arm 5 is manually moved to the groove on the disk which is directly inside of the last reproducing groove. This movement will cause a corresponding movement of the shaft 8 and disk 12 toward the lever 6, and when in this position, the disk 12 may be rotated as above described until a portion of its edge just touches or nearly touches the lever 6. The thumb nut 17 is then released, and the spring 21 holds the disk in this adjusted position.

The arm 5 is then moved outwardly to the starting groove on the disk, and by this movement the arm 9 will be moved into the position as shown in full lines in Fig. 1.

During the operation of the machine, the arm 5 travels slowly inwardly, and the arm 9 has a corresponding movement until the disk 12 strikes the lever 6, which it will do when the reproducing member engages the groove on the record as above stated.

In the form of my invention shown in Fig. 5, the disk 12 is provided with the ribs, and the arm 9 is provided with the grooves in the manner described above, but the pivot bar is of a different construction, and is free to move within the hole 23.

The pivot bar, which in Fig. 5 is indicated by the numeral 24, has its lower end threaded at 25, and this threaded end engages a threaded opening 26 in the arm 9, so that when the thumb nut 27 is turned, the threaded end 25 will move either into or out of the threaded opening 26 for the purpose of adjusting the eccentric 12.

While I have described my invention as taking a particular form, it will be understood that the various parts of my invention may be changed without departing from the spirit thereof, and hence I do not limit myself to the precise construction set forth, but consider that I am at liberty to make such changes and alterations as fairly come within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The combination in a talking machine having a record, mechanism for rotating the record, means movable to stop said mechanism, of a movable member, an arm secured to said member, a second member carried by and adjustable into different positions relative to said arm, and means for locking said latter member against relative accidental movement with respect to the arm, said latter means being manually movable to permit adjustment between the arm and said second member, said second member being operative to engage and move said first means to stop said mechanism, substantially as described.

2. The combination in a talking machine having a record, mechanism for rotating the record, means movable to stop said mechanism, of a movable member, an arm secured to said member, and a second member carried by and adjustable into different positions relative to said arm, and automatically operative means for adjustably securing said latter member to the arm and normally operative to prevent accidental movement between the arm and said second member, substantially as described.

3. The combination in a talking machine

having a rotatable support, a record on said support, a movable member, a stopping lever movable to effect the stopping of said support, of an arm on said second member, and a plate eccentrically mounted on said arm for engagement with the stopping lever, and means for adjustably securing the plate to the arm, substantially as described.

4. The combination in a talking machine having a rotatable support, a record on said support, a rotatable member, and a stopping lever movable to effect the stopping of said support, of an arm secured to said rotatable member and having a series of grooves therein, a plate having a series of ribs designed to engage the grooves on said arm, and means for adjustably clamping said plate to the arm, said means being operative to permit said plate to be moved away from the arm and turned into different positions, said plate being designed to engage said stopping lever to stop the rotation of said support, substantially as described.

5. The combination in a talking machine having a rotatable support, a record on said support, a rotatable member, and a stopping lever movable to effect the stopping of said support, of an arm secured to said rotatable member and having a series of grooves therein, an eccentrically mounted plate having a series of ribs designed to engage the grooves on said arm, and means for adjustably clamping said plate to the arm, said means being operative to permit said plate to be moved away from the arm and turned into different positions, said plate being designed to engage said stopping lever to stop the rotation of said support, substantially as described.

6. The combination in a talking machine

having a rotatable support, a record on said support, a rotatable member, and a stopping lever movable to effect the stopping of said support, of an arm having a hole therein, and a plurality of grooves adjacent said hole, a disk having a hole located eccentrically to the center of said disk, and a series of ribs adjacent said hole in the disk, a pivot bar extending through said holes in the disk and arm, and means for adjustably securing said pivot bar whereby the ribs on the disk extend within the grooves on the arm, and the disk and arm are adjustably clamped together, substantially as described.

7. The combination in a talking machine having a rotatable support, a record on said support, a rotatable member, and a stopping lever movable to effect the stopping of said support, of an arm having a hole therein and a plurality of grooves adjacent said hole, a disk having a hole located eccentrically to the center of said disk, and a series of ribs adjacent said hole in the disk, a pivot bar extending through said holes in the disk and arm, means for adjustably securing said pivot bar whereby the ribs on the disk extend within the grooves on the arm and the disk and arm are adjustably clamped together, and a spring operative upon said adjustable securing means whereby said disk and arm are resiliently clamped together, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM R. BOYER.

Witnesses:

RHODA E. GILLIES,  
CHAS. E. POTTS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





SOUND BOX,  
#1,225,505-----L.K.Scotford,  
Patented-May 8th, 1917.  
Filed-May 9th, 1916.

L. K. SCOTFORD.  
SOUND BOX.  
APPLICATION FILED MAY 9, 1916.

1,225,505.

Patented May 8, 1917.

Fig. 1

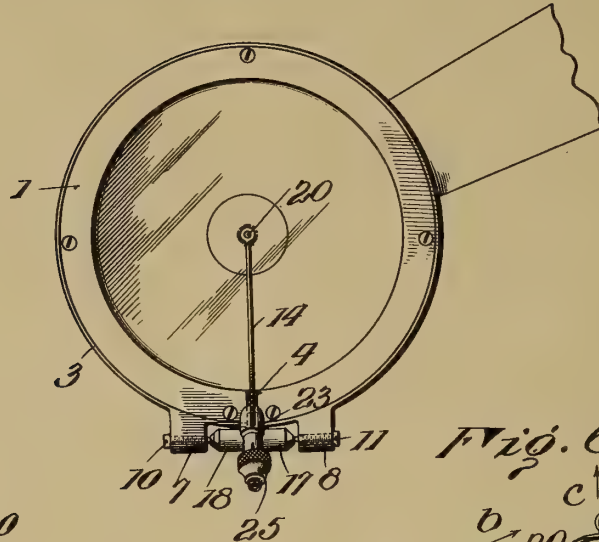


Fig. 6.

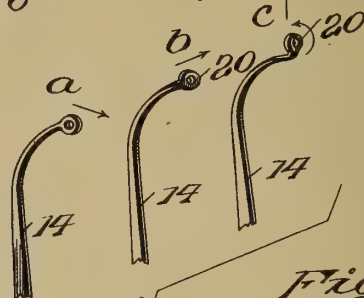


Fig. 4.

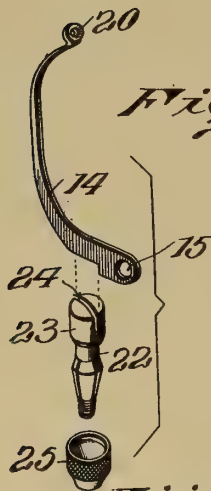


Fig. 5.



Fig. 3.

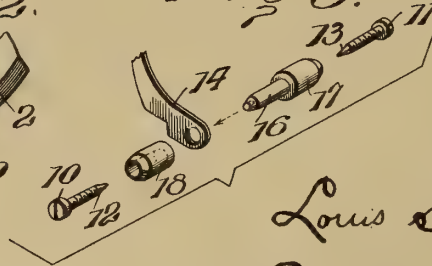
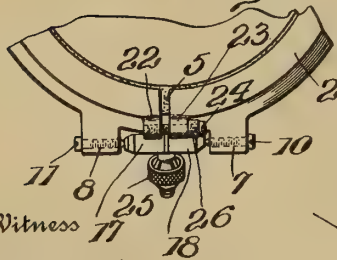


Fig. 2.



Witness  
W. A. Williams.

Inventor  
Louis K. Scotford  
By Roberton Johnson  
Attorney

# UNITED STATES PATENT OFFICE.

LOUIS K. SCOTFORD, OF CHICAGO, ILLINOIS.

## SOUND-BOX.

1,225,505.

Specification of Letters Patent.

Patented May 8, 1917.

Application filed May 9, 1916. Serial No. 96,343.

*To all whom it may concern:*

Be it known that I, LOUIS K. SCOTFORD, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a specification.

This invention relates to certain new and useful improvements in sound boxes for talking machines. The invention in its preferable embodiment will be hereinafter more fully described and then particularly pointed out in the claims.

In the drawings accompanying and forming part hereof:

Figure 1 is a front elevation of a sound box made in accordance with my invention.

Fig. 2 is a rear view of part of the same.

Fig. 3 shows in perspective view the parts for supporting the stylus bar.

Fig. 4 shows in perspective view the stylus bar and the part to which it is connected.

Fig. 5 is an elevation of the blank for forming the stylus bar.

Fig. 6 is a perspective view of the end of the blank showing the different steps in the course of the manufacture of the stylus bar.

Referring now to the details of the drawings by numerals: 1 designates the front ring of my sound box which is secured to the box proper designated by the numeral 2 in Fig. 2, the edges of this box being designated 3 in Fig. 1. Instead of being formed of a solid ring as usual, the ring 1 is split as indicated at 4 in Fig. 1, and the box proper is also split as indicated at 5 in Fig. 2. The periphery of the box is formed with two lugs 7 and 8 shown in Figs. 1 and 2, into which are threaded screws 10 and 11 with cone-shaped ends 12 and 13 shown in Fig. 3. The stylus bar is preferably formed as illustrated in Figs. 1 and 4 and is designated by the numeral 14. The rear end of this stylus bar has a perforation 15 through which projects the central part of an arbor 16 having formed thereon a boss 17. After the stylus bar has been slipped over the arbor 16 a sleeve 18, forming another boss, is slipped over the end of the arbor 16 and the part 16-17 and the stylus bar 14 and sleeve 18 are all soldered together, thus making,

in effect, one integral structure. The arbor 16 is centered between the screws 10 and 11 as illustrated in Figs. 1 and 2. Of course it will be understood that the other end 20 of the stylus bar is secured to the diaphragm in any desirable manner. The parts, preferably made as above described, are assembled in the position shown in Figs. 1 and 2, the screws 10 and 11 preferably being screwed home. In order to provide for the most delicate adjustment the rear of the box 2, on opposite sides of the "split" 5, is provided with two projections 22 and 23 (see Fig. 2). A screw 24 passes through the projection 23 and is threaded into the projection 22 so that by adjusting this screw, the space between the "split" of the ring may be adjusted as necessary. By preference I place a rubber washer 26 between the head of the screw 24 and the projection 23. By this construction I am enabled to obtain the most delicate adjustment, and do this by the movement of a single screw, and do not have to depend upon the adjustment of the screws 10 and 11 which are usually provided with lock nuts.

The stylus bar is formed from a blank of the shape shown in Fig. 5 and as will be seen from this figure, the blanks can be easily punched from sheet metal. After the blanks have been formed, as shown in said figure, the eye or end 20 is bent from the position shown at *a* in Fig. 6, at right angles to the stylus proper, to the position shown at *b* in the same figure. Then the eye 20 is bent by giving it a twist and an upward bend as shown by the arrows in Fig. 6, thus producing a stylus of the shape shown in Fig. 4, and at *c* in Fig. 6. I regard this construction of stylus bar as a great improvement upon those now used.

The socket to receive the needle is preferably formed of the construction shown in Fig. 2. As there illustrated the socket proper is formed of one piece of metal designated by the numeral 22 and at one end is provided with a chuck-like arrangement and at the other end is provided with a head 23 having a slot 24. The other element of the chuck is shown at 25, but nothing new is claimed in the chuck for holding the needles. The novelty consists in the upper end of this device as shown in said Fig. 4. The thin stylus bar is inserted in the slot 24 of the head 23 and soldered therein, thus mak-



ing practically one integral structure. I desire to call particular attention to the fact that the socket is secured to the stylus bar at a point directly between the arbor 16, which constitutes the pivotal point of the stylus bar, and the eye of the bar which is secured to the diaphragm. By connecting the needle socket to the stylus bar at this point, I obtain the best possible results as the vibrations do not have to pass through the comparatively heavy pivot construction of the bar but are transmitted direct from the stylus bar to the diaphragm.

From the foregoing and accompanying drawings it will be seen that I have produced a very simple form of sound box and stylus bar construction, one that will give the most delicate adjustment and which will also transmit the vibrations directly from the needle to the stylus bar.

What I claim as my invention is:

1. In a sound box, the combination of a box proper, and a stylus bar pivotally supported thereby, the box being split and having its ends adjustable toward each other, substantially as described.

2. In a sound box, the combination of a box proper having lugs projecting therefrom, and a stylus bar pivotally supported between said lugs, the box being split and having its ends adjustable toward each other, substantially as described.

3. In a sound box, the combination of a box proper having lugs projecting therefrom, a stylus bar pivotally supported between said lugs, the box being split and having lugs projecting from its ends on opposite sides of the "split", and a screw for adjusting the last named lugs, substantially as described.

4. In a sound box, the combination of a box proper having lugs projecting therefrom, a stylus bar pivotally supported between said lugs, the box being split and having lugs projecting from its ends on opposite sides of the "split", a screw for adjusting the last named lugs, and a flexible washer between the head of said screw and one of said lugs, substantially as described.

5. In a sound box, the combination of a box proper having lugs projecting therefrom, a stylus bar having its arbor supported between said lugs, said box being split and having lugs projecting therefrom on opposite sides of said "split", and a screw for adjustably securing said last named lugs together, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

LOUIS K. SCOTFORD.

Witnesses:

HENRY F. HACKER,  
F. M. BIELENBERG.

ATTACHMENT FOR GRAPHOPHONE  
MACHINES,

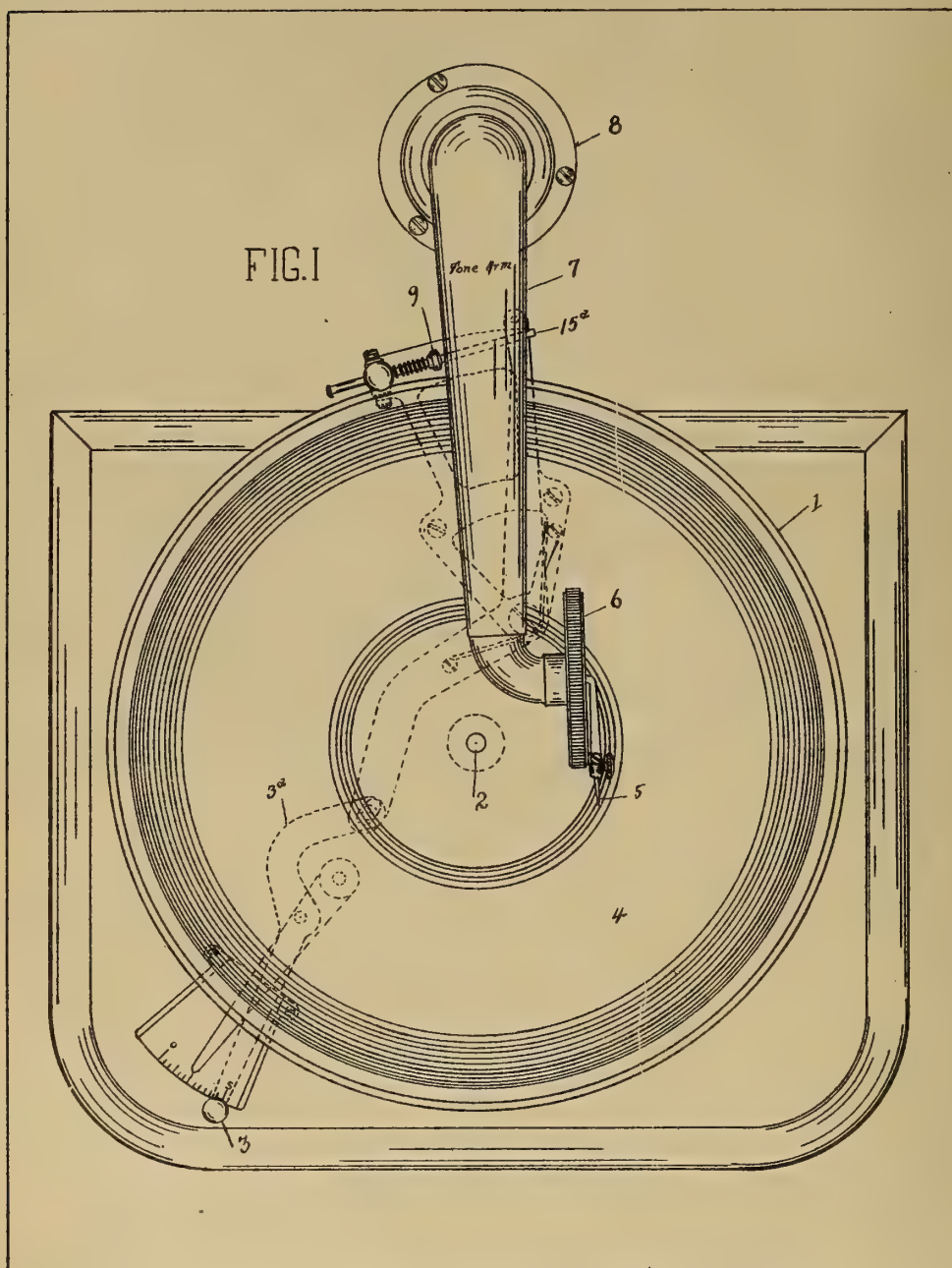
#1,225,538-----E.C.Walter,  
Patented-May 8th, 1917.  
Filed-June 5th, 1913.

ATTACHMENT FOR GRAPHOPHONE MACHINES.

1,225,538.

Patented May 8, 1917.

3 SHEETS--SHEET 1.



James Atkins.  
Frank A. Kane.

*Edward C. Walter*

BY  
*Edmund H. Parry*  
 ATTORNEY



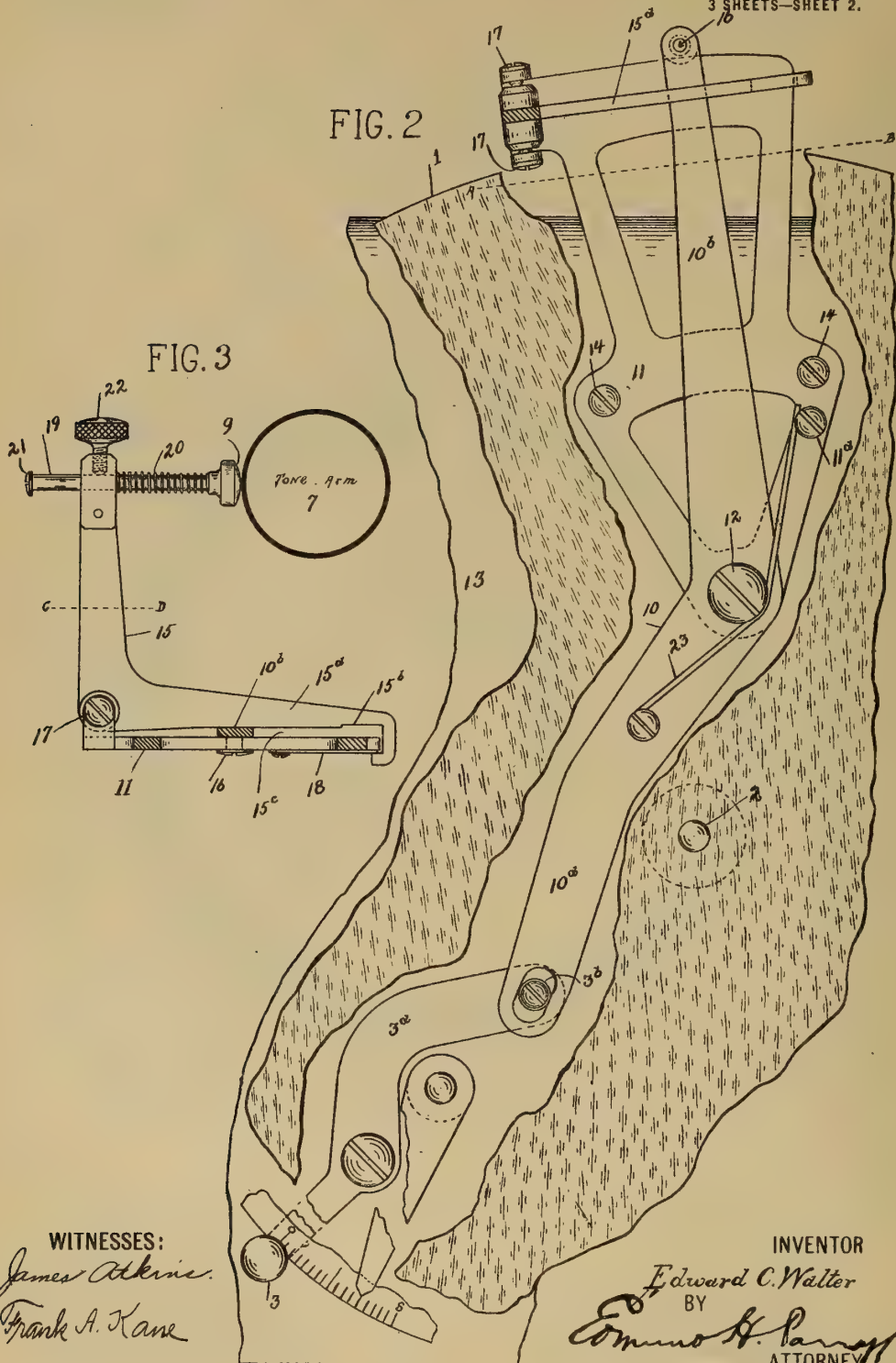


E. C. WALTER.  
ATTACHMENT FOR GRAPHOPHONE MACHINES.  
APPLICATION FILED JUNE 5, 1913.

1,225,538.

Patented May 8, 1917.

3 SHEETS—SHEET 2.



WITNESSES:  
*James Atkins.*  
*Frank A. Kane*

INVENTOR  
*Edward C. Walter*  
BY  
*Emmo H. Parrott*  
ATTORNEY



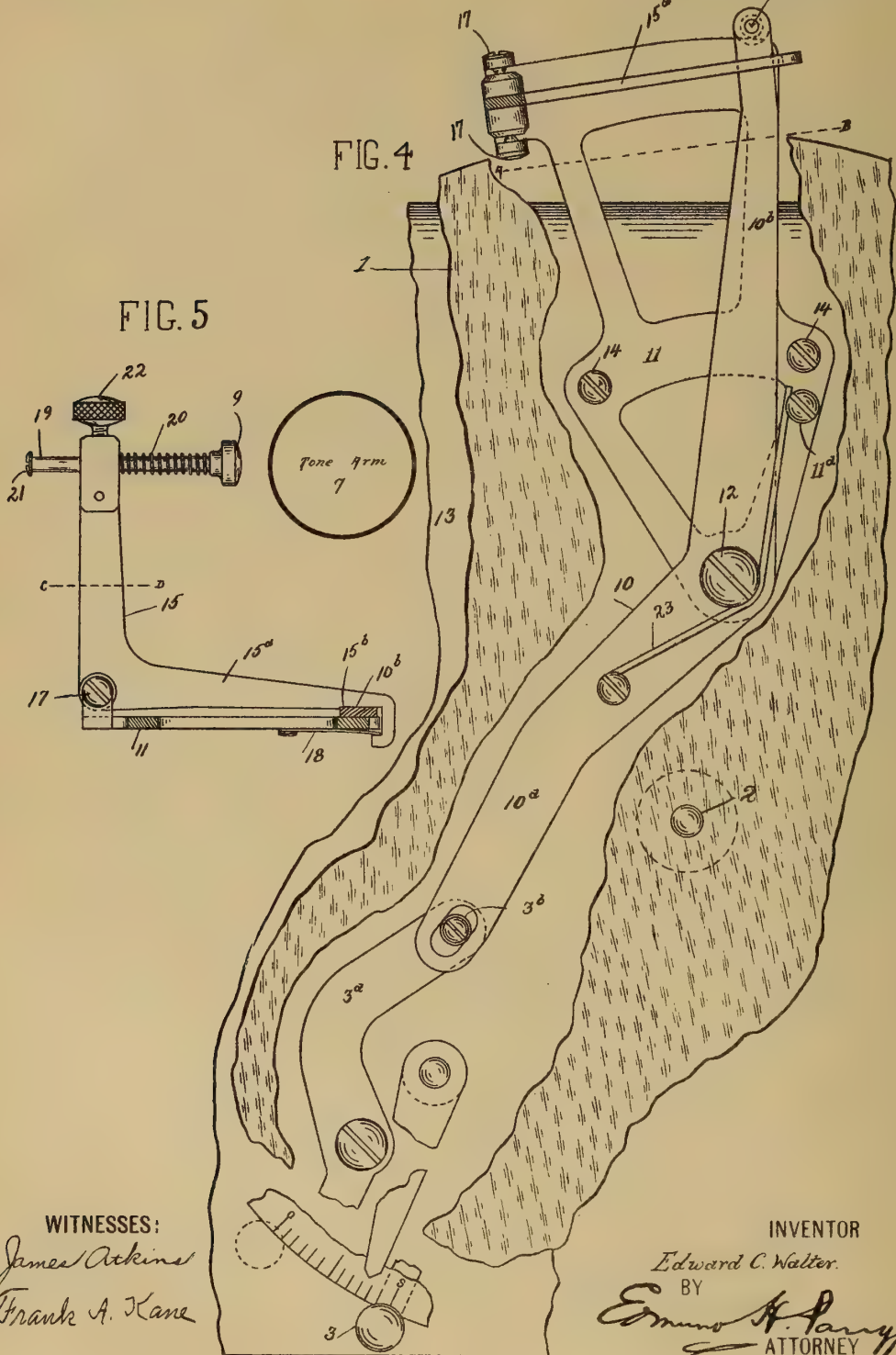


E. C. WALTER.  
ATTACHMENT FOR GRAPHOPHONE MACHINES.  
APPLICATION FILED JUNE 5, 1913.

1,225,538.

Patented May 8, 1917.

3 SHEETS—SHEET 3.



WITNESSES:

*James Atkins*  
*Frank A. Kane*

INVENTOR

*Edward C. Walter.*

BY

*Edmund H. Parry*  
ATTORNEY

# UNITED STATES PATENT OFFICE.

EDWARD C. WALTER, OF NEW YORK, N. Y.

ATTACHMENT FOR GRAPHOPHONE-MACHINES.

1,225,538.

Specification of Letters Patent.

Patented May 8, 1917.

Application filed June 5, 1913. Serial No. 771,978.

*To all whom it may concern:*

Be it known that I, EDWARD C. WALTER, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Attachments for Graphophone-Machines, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to graphophones and more particularly to an arresting or stopping device therefor, and is especially adapted for use in connection with the so-called "Grafonola."

A primary object of the invention is to provide a construction whereby it becomes unnecessary for the operator to give special attention to the machine after it has been started and until another record is to be played. It is usually necessary, in graphophones, that the operator at the end of the record, stop the machine; whereas, by employing my improved form of automatic arresting device, the operator is relieved of this necessity.

By reason of the employment of such a device in this style of machine, and by thus effecting an automatic arresting thereof at the end of the record, the disagreeable bumping sound which is usually heard is eliminated.

Another object of the invention is to provide a simple but convenient form of device for reducing to a minimum the necessity of winding the motor spring. A great saving of labor is thus effected because the machine is stopped automatically at the end of a record and no extra revolutions of the disk are thus permitted. As a result, the energy of the motor spring is conserved.

Among other features of the invention may be mentioned the fact that it is preferably constructed in the form of an attachment so that it may be conveniently secured to the machine and, when thus attached thereto, does not interfere with the operating mechanism thereof in any way until the record has been played completely, whereupon my device automatically operates to stop the machine. Moreover, by the use of my device, the operation of starting or stopping the machine is not changed

in any way, since the device operates the starting and stopping lever to stop the machine.

With these and other objects in view, the invention resides in the structure and in the novel details and arrangement of parts thereof, all as more particularly hereinafter described and set out in the claims.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate a preferred embodiment of the invention, the same serving in connection with the description herein to explain the principles of the invention.

In these drawings:

Figure 1 is a view in plan of a so-called "Grafonola", showing the revolving disk thereof and a record, and illustrating also the tone arm, the starting and stopping lever, and my improved automatic stopping device;

Fig. 2 is a fragmentary view, in plan, with the revolving disk broken away, and showing the starting lever standing at the "shut-off"-position;

Fig. 3 is a view in sectional elevation of the rear end of the device, the section being taken on the line A—B, Fig. 2, and showing the parts in the position they occupy after the tone arm has tripped the mechanism;

Fig. 4 is a view similar to Fig. 2 and showing the mechanism standing at the "on"-position.

Fig. 5 is a view similar to Fig. 3, the section in this instance being taken on the line A—B, Fig. 4, and showing the parts in the position they occupy before the tone arm has reached and operated the tripping element of the device;

In these drawings, the numeral 1 designates a disk of ordinary form mounted on a spindle 2 which is rotated by a motor that operates under the control of a lever 3.

As usual, a record 4 is placed on the disk and has on its face a spiral groove which starts at the outer edge of the record and terminates near its center. The diameter of the last portion of the groove, in different records, varies considerably. As customary, a needle or pointed wire 5 is placed in the sound-box 6 attached to the outer end of a tone arm 7. This arm is loosely mounted in a bearing 8 so that, when the needle is po-



sitioned in the outer groove of the record, and the disk moves under the action of the motor when the same has been thrown into operation by the control lever 3, the tone arm will be caused to move from the right to the left as the needle traverses the spiral groove.

Unless some provision is made for arresting the machine when the needle reaches the end of the groove, the motor will be permitted to operate unnecessarily and with a consequent bumping sound. The provision of instrumentalities for arresting the parts at a predetermined point is, therefore, what the present invention contemplates. To this end, the aforementioned tone arm, in moving from right to left, is adapted to engage a buffer element 9 when the arm has reached, say, next to the last groove in the record-disk, and by means of the parts now to be described and set into motion when the arm abuts against said buffer, the control lever 3 is moved toward the left and the machine is stopped.

As shown in Figs. 1, 2 and 4, the control lever 3 is provided with an extension 3<sup>a</sup> carrying at one end a roller 3<sup>b</sup> adapted to operate in a slot formed at one portion 10<sup>a</sup> of an actuating arm 10 pivoted on an axis 12 extending from a base member 11, the latter being fastened to the top 13 of the machine by screws 14. Another portion 10<sup>b</sup> of the actuating arm 10 occupies a position between the base 11 and a tripping lever 15 and carries a shoulder screw 16, the head of which projects underneath the base 11 so that the actuating arm 10 may have a horizontal movement but no vertical movement.

The tripping lever 15 is pivoted on an axis formed by two pointed screws 17, and includes a lower arm 15<sup>a</sup> which overlies the rear portion 10<sup>b</sup> of the actuating arm 10. This arm is provided with a notch 15<sup>b</sup> in which the portion 10<sup>b</sup> of the arm 10 will rest when moved into that position by the movement of the control lever 3 to the right. This arm 15<sup>a</sup>, as shown, extends somewhat beyond the base 11 to form a hook. Secured to the underside of the base member 11 is a light spring 18 which is maintained in operative position by the hooked end of the arm 15<sup>a</sup>, as clearly shown in Fig. 5. When the spring is flexed by the action of the tone arm engaging the upper portion of the lever 15, the space 15<sup>c</sup> between the arm 15<sup>a</sup> and the base member 11 is just sufficient to allow the arm 10<sup>b</sup> to move therein.

Preferably and as shown, the upper member of the tripping-lever 15 is bifurcated to receive and support a spindle 19 carrying a rubber buffer 9 at one end and encircled by a spring 20. Into the opposite end of the spindle is threaded a screw 21 which serves to prevent the spindle from being displaced

from lever 15 under the influence of the spring 20 when a binding-screw 22 (threaded into the upper end of the lever and adapted to engage the spindle) is loosened.

As shown in Figs. 2 and 4, a spring 23—secured at one end to the portion 10<sup>a</sup> of the actuating-arm 10 and resting against a stud 11<sup>a</sup> on the base-member 11 and encircling the screw 12—is adapted to be tensioned by the movement of said arm 10 when the controlling lever 3 is moved to the right by the operator. The function of this spring is to reshift the actuating-arm 10, in the direction opposite to that in which it has previously been moved, when released from the notch 15<sup>b</sup> in the lever 15 by the action of tone arm 7 abutting against the lever and rocking it on its fulcrum 17. The tendency of the spring 18 is to force the lever 15 toward the tone-arm so that, when said arm is moved away from the lever and the controlling-lever 3 is moved toward the right, the portion 15<sup>a</sup> of the tripping lever 15 will drop slightly whereupon the notch 15<sup>b</sup> will retain the actuating-lever 10 and the upper portion of the tripping-lever will move slightly toward the right.

To set or adjust this mechanism, described in the foregoing, the operator—preliminary to starting the machine—places the needle in the last groove—that which is nearest the center of the record—and, while the needle is in this position, first loosens and then tightens the binding-screw 22. When the screw is loosened, the spring 20 will act to move the spindle 19 toward the right until the buffer 9 engages the tone-arm 7. When said screw is then tightened, the spindle will be held against movement and in the position to which it had been actuated by the spring. Such adjustment of the spindle is provided for because of the fact that the relative position of the last portion of the groove varies in different records.

When the screw 22 has been tightened, as aforementioned, the operator moves the tone-arm 7 toward the right and beyond the record. He may then start the machine by moving the controlling-lever 3 toward the right whereby the spring 23 is tensioned and this allows the lever 15 to be rocked on its axis by the spring 18 so that its notched portion 15<sup>b</sup> may retain the actuating-arm 10 and its upper portion be moved slightly toward the right. Now, as soon as the machine is running, the operator places the needle in the outer groove of the record and, as the machine continues to operate, it will cause the tone-arm 7 to be moved toward the left until it finally engages the upper portion of the tripping lever and moves it toward the left. This movement causes the lower portion 15<sup>b</sup> of said lever to release the actuating-arm 10 which, acting under the influence of the spring 23, moves



and shifts the controlling lever 3 to the "off"-position. In this manner, the machine will have been automatically stopped.

Before the record which has then been completed is removed, the screw 22 is loosened so that the spindle 19 may be drawn back to tension its spring 20, whereupon said screw is tightened. If, however, the last groove of the next record is of larger diameter, it is unnecessary to draw the spindle 19 back, since it would move toward the right when being adjusted for the larger diameter, though it would not permit the tone-arm to be moved sufficiently toward the left if the adjustment were for a smaller diameter.

As will be seen, no different adjustment is required when a record is to be repeated, that is, used a second time, because any particular adjustment is not destroyed until the aforementioned binding-screw is manipulated.

As will now be manifest, the simple manipulation of the binding-screw (when the needle is positioned in the last groove of the disk) adjusts and prepares the machine automatically to stop at the end of the record and without any other change in the operation of the machine. In other words, in lieu of the operator, himself, having to move the controlling-lever toward the left to stop the machine, my improved and automatic stopping-device effects this. If, for any reason it is desired or it becomes necessary to stop the machine before the end of a record has been reached, it is only necessary for the operator to touch the buffer 9 and this will then effect a release of the parts and stop the machine in the same manner as if said buffer had been operated by the tone-arm 7, as already described, to effect an automatic arresting of the machine's operation.

The construction and appearance of my attachment are such that, when applied to a machine, it does not detract at all from its attractiveness, since all that is in evidence of the attachment at the front of the machine is the upper portion of the tripping-arm. The remainder of the structure is beneath the revolving disk.

From the foregoing, it will be understood that the various parts and devices, singly and in their coöperation, contribute to effect a reliable and convenient stopping of the machine at a predetermined point and that, therefore, a structure has been provided which realizes the objects of the invention and the advantages herein set forth, together with other objects and advantages.

The invention in its broader aspects is not limited to the particular construction shown, nor to any particular construction by which it has been or may be carried into effect, as many changes may be made in the construc-

tion without departing from the main principles of the invention and without sacrificing its chief advantages.

Manifestly, my improvement may be utilized for purposes other than stopping graphophones. In fact, it is well adapted for controlling the operation of analogous or other types of machines employing motor-driven instrumentalities, a controlling-device therefor, and a movable member acting under the control of the motor-driven instrumentalities.

What I claim is:

1. A device of the kind described including in combination, a motor-driven element, a controlling instrumentality therefor, a movable arm coöperating with the motor-driven element, a bell-crank-lever tiltable on an approximately horizontal axis in relation to the movable arm and provided with an arm-locking notch, and a swinging arm extending from the controlling instrumentality and underlying the bell-crank-lever and moving on an approximately vertical axis; the bell-crank-lever being tiltable on its horizontal axis to effect engagement and disengagement of its notched portion with the swinging arm when the same swings on its vertical axis.

2. A device of the kind described including in combination, a motor-driven element, a controlling instrumentality therefor, a movable arm coöperating with the motor-driven element, a bell-crank-lever tiltable on an approximately horizontal axis in relation to the movable arm and provided with an arm-locking notch, and a swinging arm extending from the controlling instrumentality and underlying the bell-crank-lever and moving on an approximately vertical axis; the bell-crank-lever being tiltable on its horizontal axis to effect engagement and disengagement of its notched portion with the swinging arm when the same swings on its vertical axis, and a spring for actuating the swinging arm.

3. A device of the kind described, including in combination, a motor-driven disk-operating element, a movable arm coöperating therewith, a machine-controlling contrivance comprising an actuating arm, a tripping lever arranged in the path of movement of said traveling-arm and adapted to be operated thereby, a base-member to which said tripping member is operatively connected, said actuating arm being centrally-pivoted on said base-member and interposed between said base-member and said tripping member and adapted to be held in one position by said tripping member, and means operating on said actuating arm to move the same when released from said tripping-member.

4. A device of the kind described, including in combination, a motor-driven operat-



ing-element, a movable element-operated arm overlying the same, a machine-controlling contrivance, including a controlling-lever, a spring-operated actuating-arm connecting with said controlling-lever and adapted to be moved in one direction by said controlling-lever, arm-operating means acting on said actuating-arm to move it in the opposite direction, a base-member underlying said actuating-arm, and a tripping-member overlying said actuating-arm and occupying a position in the path of movement of said element-operated arm, whereby when the latter engages said tripping-member, said actuating-arm is thereby released and moved under the action of the aforementioned arm-operating means.

5. A device of the kind described, including in combination, a motor-driven operating-element, a movable element-operated arm overlying the same, a machine-controlling contrivance, including a controlling-lever, a spring-operated actuating-arm connecting with said controlling-lever and adapted to be moved in one direction by said controlling-lever, arm-operating means acting on said actuating-arm to move it in the opposite direction, a base-member underlying said actuating-arm, and a tripping-member overlying said actuating-arm and occupying a position in the path of movement of said element-operated arm, whereby when the latter engages said tripping-member, said actuating-arm is thereby released and moved under the action of the aforementioned arm-operating means, said tripping-member carrying an adjustable buffer-element adapted to be engaged by said element-operated arm to move it and the tripping-member.

6. A device of the kind described, including in combination, a motor-driven disk-operating element, a traveling arm cooperating therewith and movable thereby, and a controlling contrivance therefor comprising a controlling lever, an actuating arm adapted to be moved in one direction by said controlling-lever, arm-operating means acting on said actuating arm to move it in the opposite direction, a stationary base-member underlying said actuating-arm, a bell-crank tripping-lever pivoted to said base-member and overlying said actuating-arm and provided with an angulated and notched end adapted to retain said actuating-arm, and a trip-operating buffer-element carried by and adjustable in said tripping-member and adapted to be engaged by said traveling arm.

7. A device of the kind described, including in combination, a motor-driven disk-operating element, a traveling arm cooperating therewith and movable thereby, a controlling contrivance therefor comprising a controlling-lever, an actuating arm adapted to be moved in one direction by said controlling-

lever, arm-operating means acting on said actuating-arm to move it in the opposite direction, a stationary base-member underlying said actuating-arm, a bell-crank tripping-lever pivoted to said base-member and overlying said actuating-arm and provided with an angulated and notched end adapted to retain said actuating-arm, a trip-operating buffer-element carried by and adjustable in said tripping-member and adapted to be engaged by said traveling-arm, and means for retaining said buffer-element in any of a plurality of adjustable positions.

8. The combination in a device of the kind described, of a base-member provided with two projections, a bell-crank lever mounted between said projections, means for holding the lever between the projections, one end of said bell-crank lever overlying and also underlying and movable into engagement with the base-member and having its movement limited thereby, an adjustable shaft and a set screw on the other end of the lever.

9. The combination in a device of the kind described, of a base-member provided with two projections, a bell-crank-lever mounted between said projections, means for holding the lever between the projections, one end of said bell-crank-lever overlying and also underlying and movable into engagement with the base-member and having its movement limited thereby, and a spring interposed between the base and the bell-crank-lever and operable to disengage the lever from the base.

10. The combination in a device of the kind described, of a base-member provided with journals, a bell-crank lever supported therein, one arm of said lever extending under the base-member to limit movement thereof in one direction, and a lever carried by the base-member and extending between another arm of the bell-crank lever and the base-member to prevent movement of the arm in the other direction, said last-mentioned arm being provided with a notch to allow movement of the arm in one direction when the lever is positioned therein.

11. A device of the kind described, including in combination, a motor-driven element, a controlling-instrumentality therefor, a movable arm cooperating with said motor-driven element, a bell-crank arm having a restricted movement, an adjustable shaft against which the movable arm abuts, one arm of the lever being provided with a notch, and an arm extending from the controlling-instrumentality and underlying the bell-crank and adapted to be held in one of its operating positions by the notch.

12. The combination in a machine of the kind described, of a starting lever, an extension on said lever provided with a stud, a base-member, and a compound lever ful-

crumed on said base-member, one end of said compound lever being provided with an elongated hole to straddle the stud, the other end of the compound lever being provided with a headed stud which extends beneath the base-member to hold the end of the compound lever close to the base-member.

13. The combination in a device of the kind described, of a swinging arm adapted to occupy a temporary position, a base-member, a bell-crank lever and an actuating lever, said bell-crank lever being normally held in a fixed relation to said base-member by said base-member and actuating lever and provided with a notch to permit movement of the bell-crank lever when said actuating lever is positioned thereunder, a spring for moving said bell-crank lever to cause the notch to hold the actuating lever against movement until the bell-crank lever is moved by the swinging arm being brought to the temporary position, a second spring on said base-member for moving the actuating lever when released from said notch, and a lever for moving said actuating lever to a position to be held by the notch.

14. Stop mechanism comprising a swinging arm, a base-member, a bell-crank lever on the base-member and against which the swinging arm abuts to move the same after it has been adjusted to a predetermined position, an actuating lever carried by said base-member and held in one position by said bell-crank lever, a spring on said base-member for moving the actuating lever upon

being released from said bell-crank when said swinging arm abuts thereagainst, a starting lever connected to said actuating lever to move the same to a position whereby the bell-crank lever will hold it, said starting lever being shiftable to normal position when the actuating lever is released from the bell-crank lever.

15. Stop mechanism including in combination, a control lever, a compound lever, one end of which is connected to the control lever, a base-member upon which the compound lever is fulcrumed, a spring on said base-member adapted to be tensioned by movement of the control and compound levers in one direction and operating to shift said levers in the opposite direction, a bell-crank lever provided with a notch and also fulcrumed on the base-member, said notch being adapted to be engaged by one end of the compound lever to hold it against the action of the spring therefor, an adjustable shaft connected to the bell-crank lever, and a set screw for holding the shaft in position, said shaft being actuatable to move the bell-crank lever, whereby the compound lever will be released from the notch to permit the spring to move the same to position the control lever.

In testimony whereof I affix my signature in presence of two witnesses.

EDWARD C. WALTER.

Witnesses:

JAMES McCRODDEN,  
JOHN J. CANN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





ATTACHMENT FOR PHONOGRAPHS,  
#1,225,560-----F.L.Barrows,  
Patented-May 8th, 1917.  
Filed-July 13th, 1916.

F. L. BARROWS.  
ATTACHMENT FOR PHONOGRAPHS.  
APPLICATION FILED JULY 13, 1916.

1,225,560.

Patented May 8, 1917.  
2 SHEETS—SHEET 1.

Fig. 1.

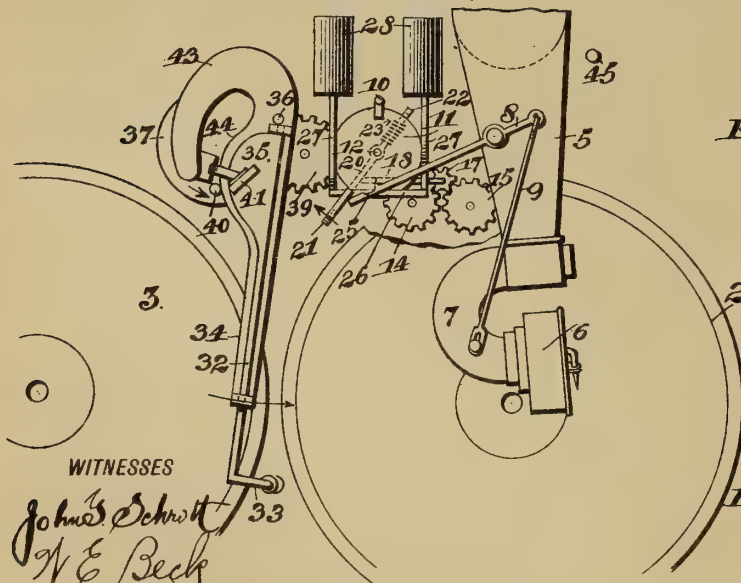
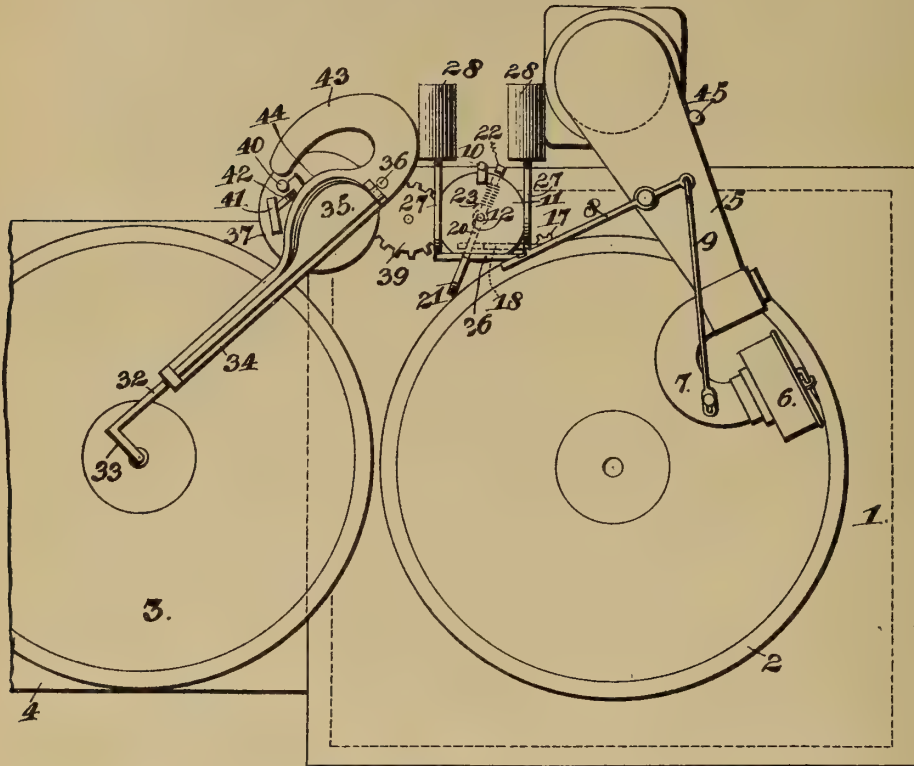


Fig. 2.

WITNESSES

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ATTACHMENT FOR PHONOGRAPHS.  
APPLICATION FILED JULY 13, 1916.

1,225,560.

Patented May 8, 1917.  
2 SHEETS—SHEET 2.

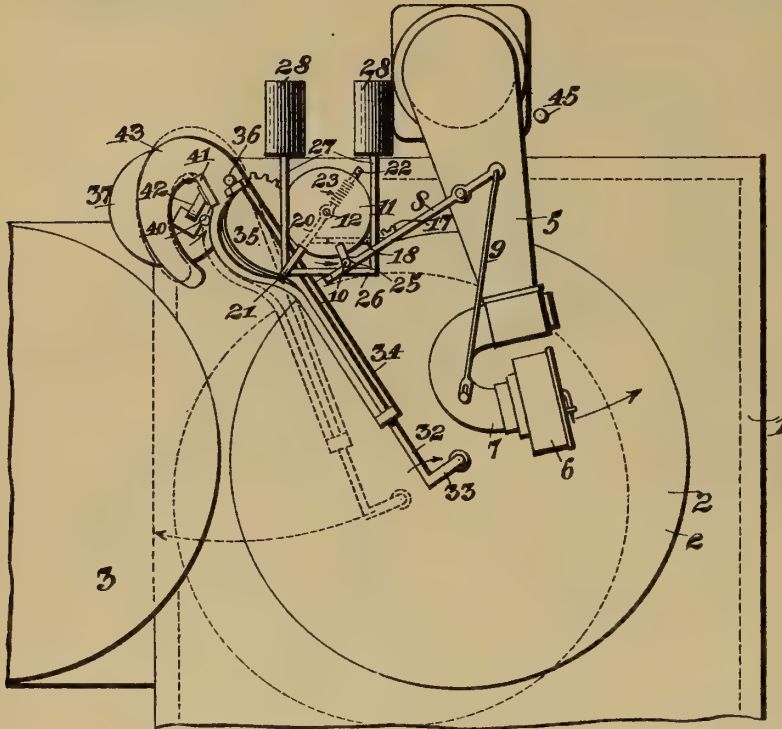


Fig. 3.

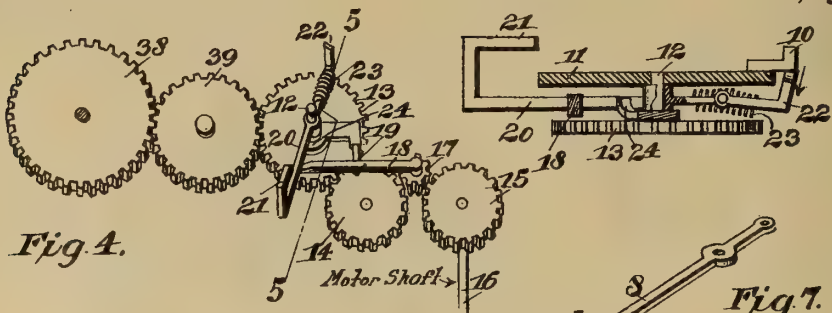


Fig. 4.

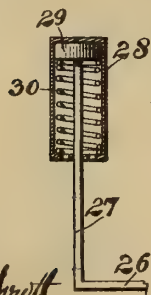


Fig. 5.

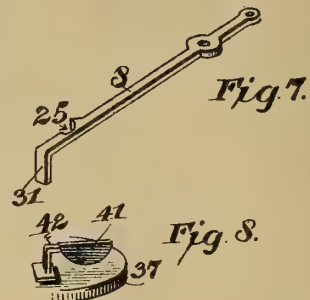


Fig. 6.

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# UNITED STATES PATENT OFFICE.

FRANK LEE BARROWS, OF MOSCOW, IDAHO.

## ATTACHMENT FOR PHONOGRAPHS.

1,225,560.

Specification of Letters Patent.

Patented May 8, 1917.

Application filed July 13, 1916. Serial No. 109,047.

*To all whom it may concern:*

Be it known that I, FRANK L. BARROWS, a citizen of the United States, and a resident of Moscow, in the county of Latah and State of Idaho, have invented an Improvement in Attachments for Phonographs, of which the following is a specification.

My invention is an improvement in attachments for phonographs, and has for its object to provide an attachment capable of connection with a phonograph of ordinary type and operated by the motor of the phonograph for permitting a series of records to be played in succession, wherein mechanism is provided for lifting the reproducer arm at the end of each selection, and moving it to the place of beginning, and wherein other mechanism is provided for removing the uppermost record while the arm is lifted.

In the drawings:

Figure 1 is a top plan view of the attachment in place, showing the parts at the commencement of the playing of a record.

Fig. 2 is a similar view showing the position of the parts at the end of the playing of a record.

Fig. 3 is a similar view showing the position of the parts during the removal of the record.

Fig. 4 is a perspective view of the gear throwing mechanism.

Fig. 5 is a section on the line 5—5 of Fig. 4.

Fig. 6 is a section through one of the spring plungers.

Fig. 7 is a perspective view of the reproducer moving lever.

Fig. 8 is a perspective view of the cam for operating the removing arm.

The attachment consists of two portions, namely the reproducer arm operating mechanism and the record removing mechanism. The attachment is shown in connection with a phonograph 1 of ordinary construction, having a turn-table 2 for receiving the records 3, which are placed upon the turn-table in superposed relation, and from which they are removed onto a table 4 arranged adjacent to the phonograph casing. The reproducer arm 5 is mounted to swing in the usual manner from the end of the record to the commencement, the record shown in the present instance reading from periphery to the center.

The reproducer 6 is carried by the U-

shaped member 7 which is pivoted at the end of the arm on a transverse axis to permit the reproducer to be swung upwardly away from the record before it is moved outwardly. A lever 8 is pivoted on the reproducer arm, and a link 9 connects one end of the lever with the U-shaped member 7, the said connection being a lost motion connection, as shown. This lever is operated by a pin 10 on a disk 11, which is secured to a stub shaft 12, and the stub shaft is provided with the gear wheel 13 below the disk.

This gear wheel meshes with a pinion 14 which is adapted to be connected with a pinion 15 on the motor shaft 16 of the machine. These pinions 14 and 15 are normally disconnected, being spaced apart from each other, and they are adapted to be connected by a pinion 17 journaled on one end of a lever 18, which is pivoted to one of the arms of a fixed bracket 19. The pinion 17 is a bevel pinion, and the lever 18 is so balanced that the pinion will normally drop between the pinions 14 and 15 to connect them together. It is, however, normally held in the position of Fig. 4 by a cross or trip lever 20 journaled on the shaft 12 between the disk 11 and the gear wheel 13. This lever, as shown, extends beyond the periphery of the disk and has an angular portion extending above the disk, as shown more particularly in Fig. 5. This lever normally holds the position shown in Fig. 5, over the beveled end of the lever 18, which is in fact a cam lever.

When the reproducer moves into the position shown in Fig. 2, that is when the end of the record is reached, the end of the lever 8 remote from the reproducer arm will engage the angular portion 21 of the trip lever, and will swing it away from the lever 18, permitting the bevel gear 17 to drop in between the gears 14 and 15, to connect the motor shaft with the gear 13. At the opposite end from the angular portion, the lever 20 has an angular arm 22, which is pivoted to the lever, and normally held in alignment therewith by means of a coil spring 23. The vertical portion of the angular arm extends above the disk 11, and the said portion is adapted to be engaged by the stop pin to return the lever to the normal position of Fig. 5, and the movement of the lever into return position is limited by a stop 24 on the fixed angle bracket 19 before mentioned. This



pin 10 in its further movement engages the body 26 of a yoke-shaped member comprising the said body and arms 27. The arms 27 of the yoke are provided with pistons 29, which move in cylinders 28. Each of these cylinders has a restricted opening at its outer end and a series of openings at its inner end, and each piston is normally pressed toward the outer end of the cylinder by a spring 30. When the pin engages the body 26 of the yoke the said body is moved outward, and the springs 30 are compressed.

The lever 8 has a depending lug 31 which is engaged by the body, and the lever is swung in a direction to lift the reproducer, to release the needle from the record. The continued movement of the disk 11 causes the pin 10 to eventually engage a notch 25 in the lever 8, and when this engagement takes place the lever is moved longitudinally, to swing the reproducer arm from the center of the record to the periphery, that is to the place of beginning, to the position shown in Fig. 1. This movement takes place while the reproducer is out of engagement with the record. The reproducer must be held elevated until the played record has been removed, and it must be lowered with some degree of care. For this reason the cylinders which constitute a dash-pot are provided. After the end 10 lifts the body 26 of the yoke, the restricted openings of the cylinders cause the pistons to return slowly to the outer end of the cylinder, cushioning downward movement of the reproducer and the needle.

The mechanism for removing the record comprises a removing arm 32 having an angular portion 33 provided with a depending pin for engaging the opening of the record. In practice this arm will have a rubber sleeve at the record and it will be counter-balanced in such manner that in normal condition the pin will drop into the opening of the record. This arm is journaled upon a cam plate 34, and the arm has a laterally extending rounded cam 35 at the end remote from the angle portion. The cam plate 34 is pivoted at 36 to the phonograph casing, and the cam 35 coöperates with a disk 37 which is secured to a gear wheel 38 connected by a gear wheel 39 with the gear wheel 13 before mentioned.

The disk 37 is a cam disk, and it is provided with a wrist pin 40 and a segmental cam 41, which is secured to the horizontal portion of an angular bracket 42 on the disk in such manner that the rounded edge of the cam is adjacent to, but spaced above the disk. The end of the cam plate remote from the angular portion 33 of the record removing arm, has a curved cam extension 43, and at the cam portion 35 of the said arm, the cam plate has a rounded cam 44 registering with the said portion.

The above mechanism operates in sequence with the reproducer arm controlling mechanism, moving into engagement with the record as the reproducer is lifted and completing the removal of the record before the reproducer is lowered. When the disk 37 is rotated, the cam member 41 rides over the cam surface 35 of the arm 32, moving this cam portion down parallel with the plane of the cam plate. In such position, the pin on the angular portion 33 is lifted, and as soon as the pin 40 engages the adjacent edge of the cam plate, the record removing arm will be swung toward the record on the turn table. The continued movement of the disk will move the arm from the position of Fig. 1 to that of Fig. 2, and eventually to that of Fig. 3, at which time the cam 41 passes off the cam 35, and the pin on the angular portion 33 drops into the opening of the record. The continued movement of the pin 40 on the curved extension 43 will swing the arm in the reverse direction and in the position of Fig. 1, slipping the topmost record from off the turn table.

The operation of the device is as follows: At the end of the playing of a record, the parts are in the position of Fig. 2. At this moment the inner end of the lever 8 engages the portion 21 of the lever 20 and swings the said trip lever to release the lever 18. The pinion 17 immediately connects the gear 14 with the gear 15 and the cam disks 11 and 37 commence to rotate in the same direction. The weighted pin on the lug 33 is immediately lifted out of contact with the record last removed, and the arm 32 begins to swing toward the record on the turn table. In proper sequence the pin 10 will engage the lever 8, to lift the reproducer and to swing the arm into the position of Fig. 1. Before the reproducer arm has been swung against the stop 45, the pin on the lug 33 of the record removing arm will be above the opening of the record, and when the cam 41 passes off the cam 35, the arm will begin to remove the record and it will be clear of the reproducer needle before the said needle is lowered. The gears 14 and 15 are disconnected through the action of the pin 10 in connection with the angle arm 22 on the lever 20. When the pin in its continued movement engages the upstanding portion of the angle arm, the lever 20 will be swung against the stop 24 and over the beveled end of the lever 18, swinging the lever and lifting the gear 17 out of mesh with the gears 14 and 15. As soon as the lever 20 engages the stop 24, the angle arm 22 will swing downward as shown in Fig. 5, to permit the passage of the pin 10.

It will be understood that in practice the turn table will be provided with mechanism for lowering the same when the records are

placed, and for raising the turn table a sufficient distance, after the removal of each record.

It will be noticed from an inspection of Fig. 5 that the upper end of the angle arm 22 is beveled in order that the pin 10 may force the said arm downward.

I claim:

1. In combination with a phonograph, of means operated by the motor of the phonograph and controlled by the position of the needle, for lifting the reproducer, moving the reproducer arm to commencing position and lowering the reproducer into playing position, said means comprising a lever pivoted to the reproducer arm, a link connecting one end of the lever to the reproducer support for lifting the reproducer when the lever is swung in the proper direction, a cam disk, a connection between the motor and the cam disk for operating the same, a trip lever for normally holding the said connection out of engaging position, and in position to be engaged by the other end of the reproducer supported lever when the needle is at the end of the record for swinging the said trip lever to release the connecting mechanism, said lever having a notch at the said end and a disk having a pin for engaging the notch to first swing the lever to lift the reproducer, and afterward move the lever and the reproducer to commencing position, and means for cushioning the movement of the reproducer toward the record.

2. In combination with a phonograph, of means operated by the motor of the phonograph and controlled by the position of the needle for lifting the reproducer, moving the reproducer arm to commencing position and lowering the reproducer into playing

position, such means comprising a lever pivoted to the reproducer arm, a link connecting one end of the lever to the reproducer support for lifting the reproducer when the lever is swung in the proper direction, a cam disk, a connection between the motor and the cam disk for operating the same, a trip lever for normally holding the said connection out of engaging position, and in position to be engaged by the other end of the reproducer supported lever when the needle is at the end of the record for swinging the said trip lever to release the connecting mechanism, said lever having a notch at the said end and a disk having a pin for engaging the notch to first swing the lever to lift the reproducer, and afterward move the lever and the reproducer to commencing position.

3. In a combination with a phonograph, of means operated by the motor of the phonograph and controlled by the position of the needle for lifting the reproducer, moving the reproducer arm to commencing position and lowering the reproducer into playing position, such means comprising a lever pivoted to the reproducer arm, a link connecting one end of the lever to the reproducer support for lifting the reproducer when the lever is swung in the proper direction, a cam disk, a connection between the motor and the cam disk for operating the same, means for normally holding the said connection out of engaging position and in position to be engaged by the other end of the reproducer supporting lever when the needle is at the end of the record, for operating the said means to release the connecting mechanism.

FRANK LEE BARROWS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





ATTACHMENT FOR PHONOGRAPHS,  
#1,225,561-----F.L.Barrows,  
Patented-May 8th, 1917.  
Filed-November 16th, 1916.

F. L. BARROWS.  
ATTACHMENT FOR PHONOGRAPHS.  
APPLICATION FILED NOV. 16, 1916.

1,225,561.

Patented May 8, 1917.

2 SHEETS—SHEET 1.

Fig. 1.

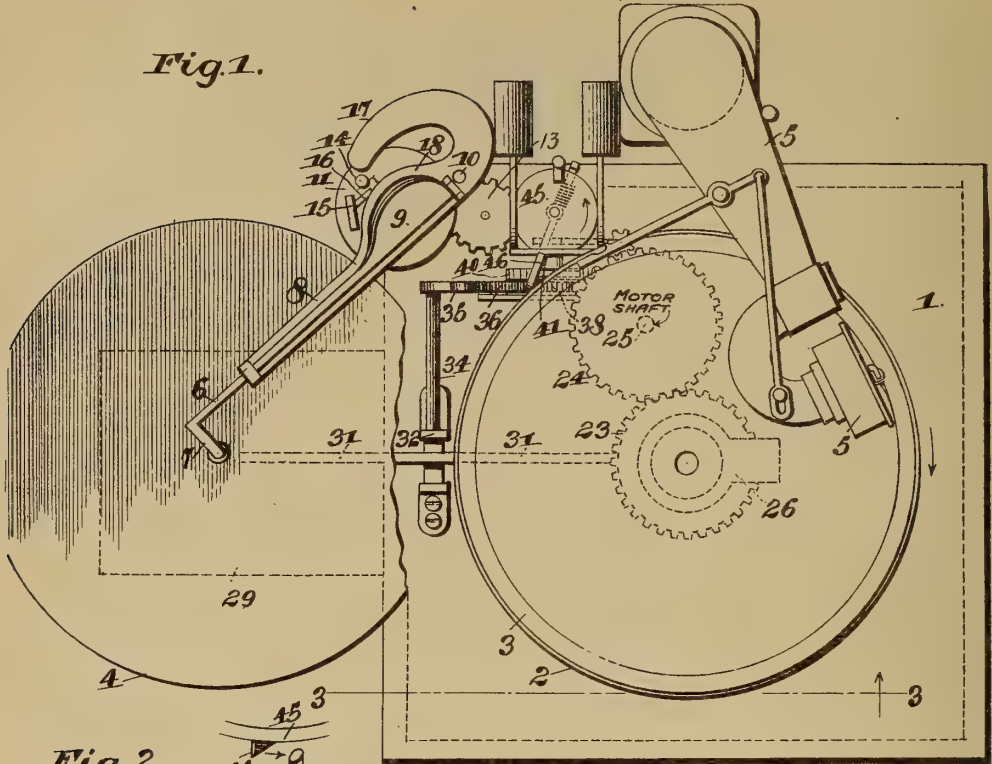


Fig. 2.

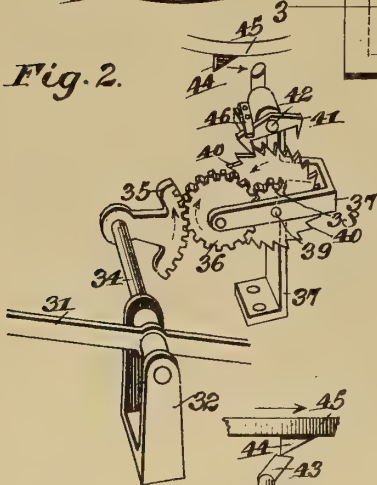


Fig. 6.



WITNESSES

John B. Schrott  
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Fig. 7.

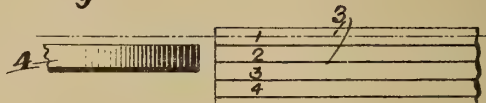


Fig. 8.

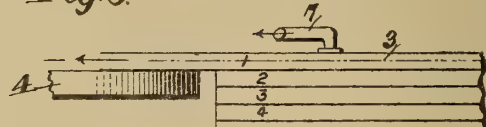


Fig. 9.

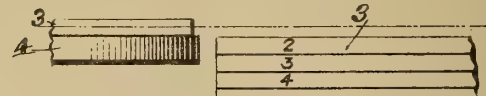


Fig. 10.

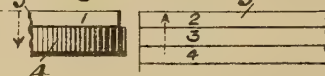


Fig. 11.



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ATTACHMENT FOR PHONOGRAPHS.  
APPLICATION FILED NOV. 16, 1916.

1,225,561.

Patented May 8, 1917.  
2 SHEETS—SHEET 2.

Fig. 3.

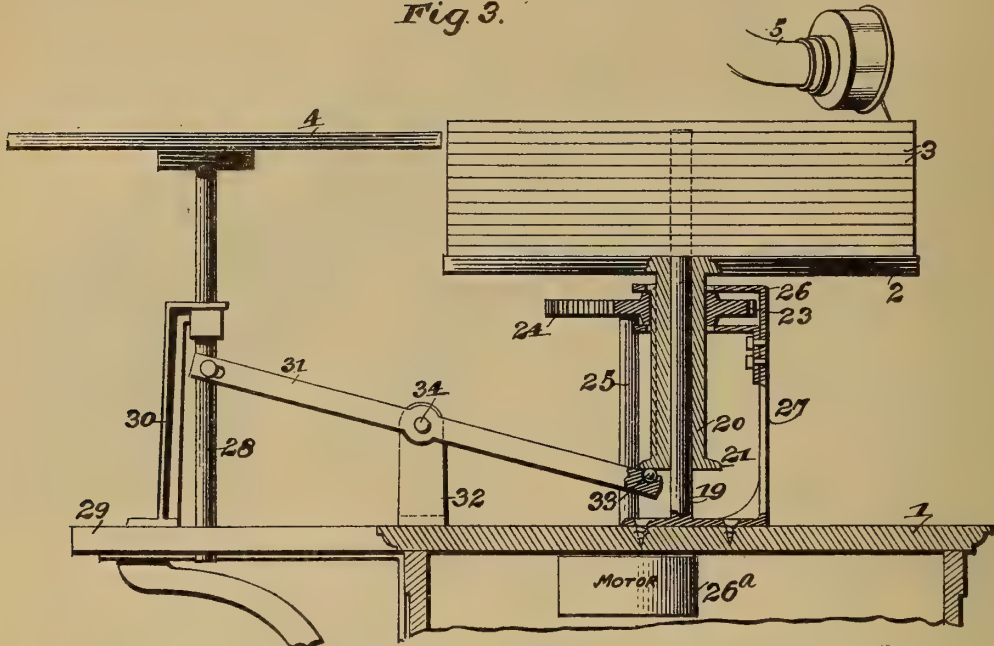


Fig. 4.

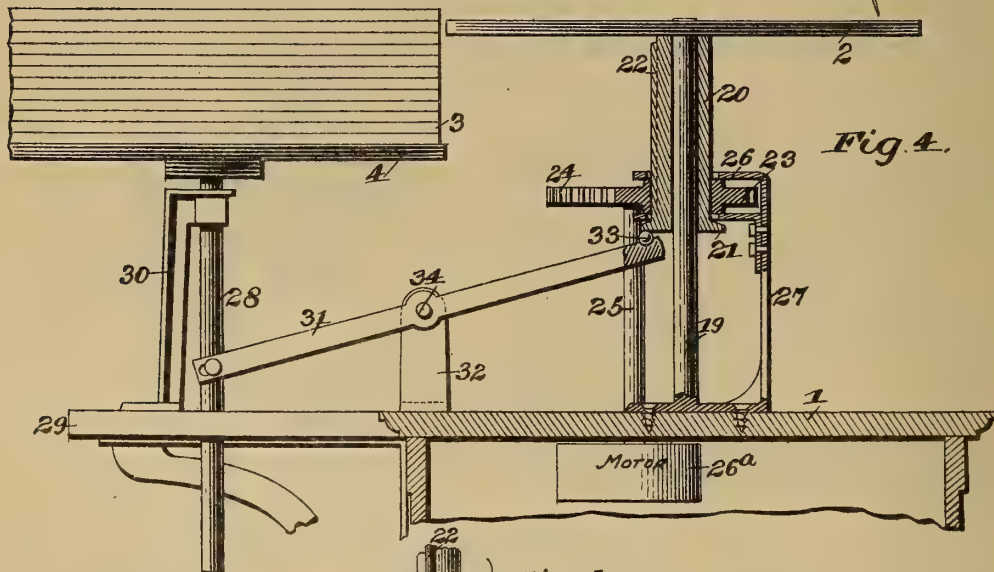
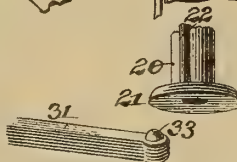


Fig. 5.



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ATTACHMENT FOR PHONOGRAPHS.

1,225,561.

Specification of Letters Patent.

Patented May 8, 1917.

Application filed November 16, 1916. Serial No. 131,689.

*To all whom it may concern:*

Be it known that I, FRANK L. BARROWS, a citizen of the United States, and a resident of Moscow, in the county of Latah and State of Idaho, have invented certain new and useful Improvements in Attachments for Phonographs, of which the following is a specification.

My invention is an improvement in attachments for phonographs, and has for its object to provide an attachment capable of connection with a phonograph of ordinary type and operated by the motor of a phonograph for permitting a series of records to be played in succession, wherein mechanism is provided for removing the topmost record from the turn table when it has been played, and wherein other mechanism is provided for gradually lifting the turn table as the records are removed, to bring the uppermost record into proper playing position.

In the drawings:

Figure 1 is a top plan view of a phonograph provided with the attachment,

Fig. 2 is a detail perspective view of the escapement mechanism, the parts being in the position shown in Fig. 3,

Fig. 3 is a section on the line 3—3 of Fig. 1, looking in the direction of the arrows adjacent to the line,

Fig. 4 is a view similar to Fig. 3 showing the position of the parts when the records have all been played,

Fig. 5 is a detail perspective view of the thimble and the ball-bearing lifter,

Fig. 6 is a detail of the escapement, and

Figs. 7 to 11 inclusive show various positions of the turn table and the record support during the removal of a played record, Fig. 7 showing the same position of the parts as in Fig. 3.

The attachment comprises means for moving the played record from the turn table to the record support, and means for raising the turn table to bring the succeeding record in the proper position for playing. The attachment is shown in connection with a phonograph 1 of ordinary construction having a turn table 2 for receiving the records 3, which are placed upon the turn table in superposed relation and from which they are removed onto a table 4 arranged adjacent to the phonograph casing. The means for lifting the reproducer arm 5 and returning it to playing position, forms the subject matter of my co-pending application, No.

109,047, filed July 13, 1916, and for this reason is not more particularly described.

The mechanism for removing the record comprises a removing arm 6, having an angular portion 7 provided with a depending pin for engaging the opening of the record, and in practice this arm will have a rubber sleeve at the record and it will be counter-balanced in such manner that in normal conditions, the pin will drop into the opening of the record. This arm is journaled upon a cam plate 8, and the arm has a laterally extending rounded cam 9 at the end remote from the angular portion. The cam plate 8 is pivoted at 10 to the phonograph casing, and the cam 9 coöperates with a disk 11 which is driven from the motor shaft 25 through a gear train indicated generally at 13.

The disk 11 is a cam disk and it is provided with a wrist pin 14 and a segmental cam 15 which is secured to the horizontal portion of an angular bracket 16 on the disk, in such manner that the rounded edge of the cam is adjacent to, but spaced above the disk. The edge of the cam plate remote from the angular portion 7 of the record removing arm, has a curved cam extension 17 and at the cam portion 9 of the said arm, the cam plate has a rounded cam 18 registering with the said portion.

The above described mechanism operates in sequence with the reproducer arm control mechanism, moving into engagement with the record as the reproducer is lifted and completing the removal of the record before the reproducer is lowered. When the disk 11 is rotated, the cam member 15 rides over the cam surface 9 of the arm 8 moving this cam portion down parallel with the plane of the cam plate. In such position the pin on the angular portion 7 of the arm is lifted, and as soon as the pin 14 engages the adjacent edge of the cam plate, the record removing arm will be swung toward the record on the turn table.

The continued movement of the disk will move the arm from the position of Fig. 1 to a position such that the pin on the angular portion 7 of the arm will be over the opening in the record, at which time the cam 15 passes off the cam 9 and the pin on the portion 7 drops into the opening of the record. The continued movement of the pin 14 on the curved extension 17 will swing the arm in the reverse direction and into the position



of Fig. 1, slipping the top record from off the turn table and moving it onto the table 4.

The turn table 2 is provided with the usual central opening through which extends the pin 19, and the records 3 are mounted in superposed position on the turn table with the pin 19 extending through the openings of the record, and this pin is of such length that when the turn table is in its lowest position, namely, that shown in Fig. 3, the pin will engage the topmost record to hold the same in proper position on the turn table. A sleeve 20 is connected with the turn table, the said sleeve being journaled on the pin 19, and this sleeve is provided at its lower end with a head or a flange 21. The sleeve also has a rib or key 22 which engages within the slot in the hub of a gear wheel 23 which meshes with the gear wheel 24 on the shaft 25 driven by the motor indicated at 26. This gear wheel 23 is held from movement vertically by means of arms 26<sup>a</sup> extending laterally from the standard 27 secured to the top of the phonograph 1, and it will be evident that the rib 22 by its engagement with a groove of a gear wheel, will constrain the sleeve and the turn table to turn with the gear wheel, while permitting the sleeve and the turn table to move vertically with respect to the gear wheel. The table 4 is secured to the top of the shaft 28 which is mounted to slide in bearings in a bracket supported extension 29 from the phonograph, and in a standard 30 on the said extension.

A lever 31 is pivoted intermediate its ends to a bracket 32 on the phonograph, and one end of the lever has a lost motion connection with the shaft. At the opposite end the lever engages beneath the flange 21, and a bolt 33 is journaled in the said end of the lever, the bolt engaging the flange, as shown in Figs. 3 and 4. The arrangement is such that the tables 2 and 4 move together in an opposite direction and at the same rate of speed. The pivotal connection between the lever 31 and the bracket 32, is a shaft 34. This shaft 34 is provided with a gear segment 35 at the end remote from the bracket 32, and the segment meshes with a pinion 36 journaled in a bracket 37 and engaging in turn with a pinion 38 on a stub shaft 39. An escapement wheel 40 is secured to the pinion 38, and a double escapement pawl 41 secured to a shaft 42 coöperates with the wheel.

The shaft 42 is journaled in the bracket 37, before mentioned, and at the opposite end from the pawl the shaft has a radial arm 43 which is adapted to be engaged by a cam 44 on the under face of the disk 45, which controls the reproducer lifting and returning arm. The escapement 41 is yieldingly held in normal position by means of springs 46 mounted on the bearing for the shaft 42.

In operation, at the commencement of the

playing, the parts are in the position shown in Fig. 3, a series of disks being mounted upon the table in superposed position with the uppermost disk in position for engagement by the needle of the reproducer. The table 4 is at the level of the bottom of the uppermost record, so that the removing arm may slip the record from the turn table directly onto the table 4. Just at the completion of the movement of the arm 6, the cam 44 operates the escapement, the shaft 34 is moved just far enough to lower the table 4 the thickness of a record and to raise the table 2 the same distance. The combined movement of the tables being equal to twice the thickness of a record, the table 4 is now in position to receive the topmost record, as shown in Fig. 11. Figs. 7 to 11 inclusive show the complete movement, Fig. 7 showing the parts at the commencement, Fig. 8 showing the record moving onto the table 4, Fig. 9 showing the completion of this movement, Figs. 10 and 11 showing the movement of the tables with respect to each other.

It will be understood that the table 4, which is the receiving table for the records, is counter-weighted so that it will overbalance the weight of the turn table and the superposed records. Thus whenever the escapement is released, the table 4 will descend, moving up the table 2 with the records. The removing of each record is controlled by the return of the reproducer to commencing position, and the means for returning the reproducer to commencing position is also controlled by the movement of the reproducer. That is, when the reproducer reaches the end of the record, it controls the lifting of the reproducer needle, the returning of the reproducer to starting position, the lowering of the needle onto the record, and the removal of the record during the lifting of the needle.

I claim:

1. In combination with a phonograph, of means operated by the motor of the phonograph and controlled by the position of the needle for removing the record, said mechanism comprising an arm having an angular lug provided with a depending pin for engaging the opening of the record, and counter-balanced to normally engage the said opening, a cam plate on which the arm is journaled, said arm having a laterally extending cam portion, a cam disk normally disconnected from the motor and having a cam for engaging the cam of the removing arm to lift the pin out of engaging position, and having a pin for engaging the cam plate to swing the arm with the pin over the opening of the topmost record and to swing the arm with the topmost record away from the turn table, and means controlled by the movement of the reproducer for connecting the said cam with the motor.



2. In combination with a phonograph having a vertically movable turn table for supporting a series of superposed records to be played in succession, a receiving table adjacent to the turn table, a lever pivoted between the tables and supporting and balancing the tables, the receiving table being counter-weighted to overbalance the turn table and a series of superposed records, an escapement device in connection with the lever, means controlled by the movement of the reproducer for moving the topmost record from the turn table to the receiving table, and means operated by the reproducer for releasing the escapement before a record has been removed to the receiving table.

3. In combination with a phonograph having a vertically movable turn table for supporting a series of superposed records to be played in succession, a receiving table adjacent to the turn table, a lever pivoted between the tables and supporting and balancing the tables, the receiving table being counter-weighted to overbalance the turn table and a series of superposed records, an escapement device in connection with the lever, and means controlled by the movement of the reproducer for releasing the escapement.

4. In combination with a phonograph having a vertically movable turn table for supporting a series of superposed records to be played in succession, a receiving table adjacent to the turn table, a connection between the tables for balancing the same, means controlled by the movement of the reproducer for moving the said tables, and means controlled by the movement of the reproducer for removing the records in succession from the turn table to the receiving table.

5. In combination with a phonograph having a vertically movable turn table for supporting a series of superposed records to be played in succession, a receiving table adjacent to the turn table, and a connection between the tables for balancing the same, and means controlled by the movement of the reproducer for moving the said tables.

6. In combination with a phonograph having a vertically movable turn table, a receiving table having a balanced connection with the turn-table for constraining them to move together in opposite directions and an escapement device for operating the tables and controlled by the movement of the reproducer.

FRANK L. BARROWS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



STOP FOR PHONOGRAPHS,  
#1,225,579-----W. E. Cleveland,  
Patented-May 8th, 1917.  
Filed-April 22nd, 1916.



W. E. CLEVELAND.  
 STOP FOR PHONOGRAPHS.  
 APPLICATION FILED APR. 22, 1916.

1,225,579.

Patented May 8, 1917.

Fig- 1 -

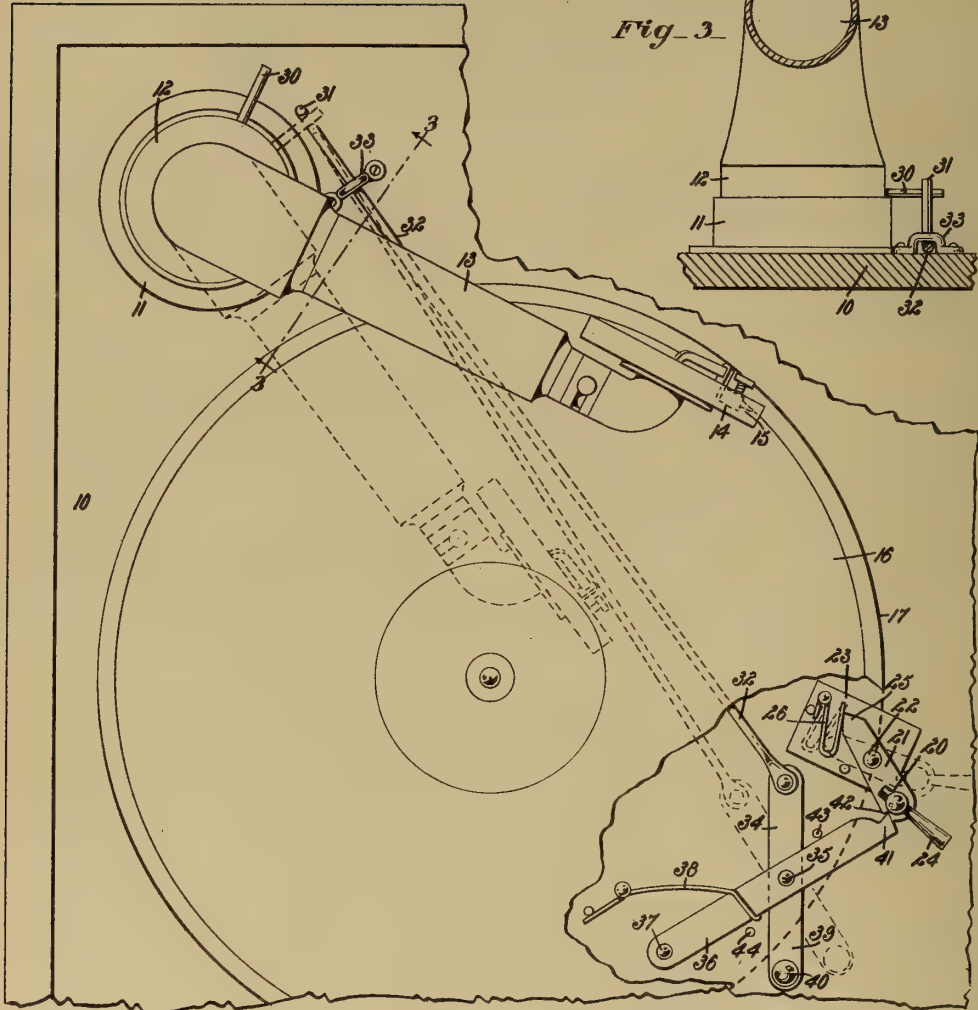


Fig- 3 -

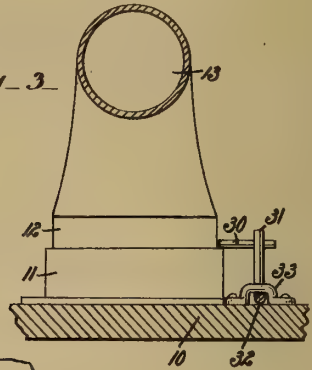


Fig- 5 -



Fig- 2 -

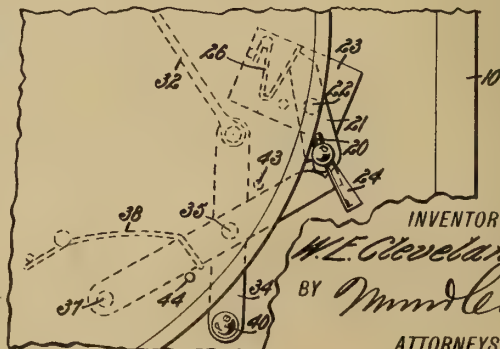
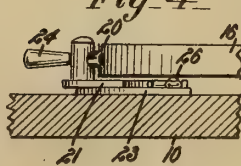


Fig- 4 -



WITNESSES

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ATTORNEYS

# UNITED STATES PATENT OFFICE

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## STOP FOR PHONOGRAPHS.

1,225,579.

Specification of Letters Patent.

Patented May 8, 1917.

Application filed April 22, 1916. Serial No. 92,996.

*To all whom it may concern:*

Be it known that I, WILLARD E. CLEVELAND, a citizen of the United States, and a resident of Fall River, in the county of Bristol and State of Massachusetts, have invented a new and Improved Stop for Phonographs, of which the following is a full, clear, and exact description.

The invention relates to phonographs of the disk record type, and its object is to provide a new and improved automatic stop arranged to automatically stop the phonograph at the time the stylus reaches the end of the record, and to allow quick and convenient adjustment of the automatic stop for larger and smaller records.

In order to accomplish the desired result, use is made of a pin on the tone arm controlling an actuating rod pivotally connected with a trigger engaging a spring-pressed brake lever adapted to engage the revolving platform whenever released by the trigger to stop the rotation of the said platform. Use is also made of a trigger consisting of two levers connected with each other by a friction pivot to allow of adjusting one lever relatively to the other, the adjustable lever being controlled from the tone arm and the other lever being controlled from the brake mechanism of the phonograph.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a plan view of the automatic stop as applied to a phonograph of the disk record type and with parts shown broken out;

Fig. 2 is a plan view of the brake lever and the trigger in released position;

Fig. 3 is a cross section of the tone arm and actuating rod, the section being on the line 3—3 of Fig. 1;

Fig. 4 is a side elevation of the brake lever in engagement with the platform, part of the phonograph frame being shown in section; and

Fig. 5 is a perspective view of the trigger. On the frame 10 of a phonograph of the

disk record type is held a bearing 11 for the base 12 of the tone arm 13 to swing on, and the said tone arm 13 carries the usual sound box 14 provided with a stylus 15 adapted to engage the record 16 held on top of the revoluble platform 17. The rotary motion of the platform 17 is adapted to be stopped by the brake shoe 20 of a brake lever 21 fulcrumed at 22 on a plate 23 attached to the top of the frame 10 immediately below the platform 17. The brake lever 21 is provided with a handle 24 for manipulating the said brake lever by hand, and the inner end of the brake lever 21 is provided with a V-shaped terminal 25, either side of which is adapted to be engaged by the free end of a spring 26 attached to the plate 23.

The brake lever 21 is held in open position and is adapted to be released automatically by a stop, presently to be described. On the base 12 of the tone arm 13 is secured a radially disposed pin 30 adapted to engage an upwardly extending arm 31 of an actuating rod 32 extending under the platform 17 and mounted to slide near its rear end in a suitable bearing 33 attached to the top of the frame 10. The forward end of the actuating rod 32 is pivotally connected with an adjusting lever 34 connected by a friction pivot 35 with a trigger lever 36 fulcrumed at 37 on the top of the frame 10. A spring 38 presses the lever 36 so as to normally swing the same rearwardly. The adjusting lever 34 has its forward end 39 provided with a handle 40 rising outside of the platform 17 to permit the operator to swing the lever 34 on the lever 36 with a view to adjust the arm 31 relatively to the pin 30 according to the size of the record to be played at the time. Normally the levers 34 and 36 are held sufficiently tight together by the friction pivot 35 to move as a unit whenever the actuating rod 32 is pushed forward by the pin 30 engaging the arm 31, as hereinafter more fully explained. The free end of the trigger lever 36 is provided with a tooth 41 adapted to engage a notch 42 on the outer end of the brake lever 21 so as to hold the same in open position, that is, with the brake shoe 20 out of engagement with the peripheral face of



the platform 17, as plainly shown in Fig. 1. The swinging movement of the trigger lever 36 is limited between stop pins 43 and 44 arranged on the frame 10 at opposite sides of the said lever.

The operation is as follows:

When the platform 17 is held at a standstill by the brake shoe 20 engaging the peripheral face of the platform 17, as shown in Fig. 2, then the free end of the trigger lever 36 engages the outer end of the brake lever 21. The operator now places the record 16 on the platform 17 and swings the tone arm 13 inward until the stylus 15 is at the end of the sound groove in the record 16 and at the same time, the operator having hold of the handle 40 manipulates the actuating rod 32 so that its arm 31 is in engagement with the pin 30. The operator now swings the tone arm 13 outwardly and then swings the brake lever 21 sufficiently far into open or release position that the tooth 41 engages the notch 42 thus holding the brake lever 21 in released position relatively to the platform 17 to allow the latter to turn. The record 16 is now played in the usual manner with the pin 30, however, a distance from the arm 31. When the stylus 15 nears the end of the sound groove the pin 30 engages the arm 31 and imparts a forward sliding movement to the actuating rod 32 whereby the levers 34 and 36 forming the trigger are swung outwardly against the tension of the spring 38 so that the tooth 41 moves out of engagement with the notch 42 and thereby releases the brake lever 21. The latter is now swung inward by the action of its spring 26 so that the shoe 20 engages the peripheral face of the platform 17 and thus stops the rotation thereof. It will be noticed that when the stylus reaches the end of the sound groove the platform 17 comes automatically to a stop. When it is desired to play the phonograph without the use of the automatic stop, then the brake lever 21 is swung into full open position, as shown in dotted lines in Fig. 1, that is, with the other side of the terminal 25 pressed on by the spring 26 to hold the brake lever in open or released position.

The automatic stop shown and described is very simple in construction and can be readily applied to different makes of phonographs as generally constructed.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. An automatic stop for phonographs, comprising an actuating rod controlled by the tone arm, a trigger, a spring pressed brake lever adapted to be engaged by the said trigger to hold the brake lever in inactive position and to release the brake

lever at the time the stylus reaches the end of the record, and an adjusting lever connecting the rod and trigger and pivotally connected with both.

2. An automatic stop for phonographs, comprising an actuating rod controlled by the tone arm, a trigger having two levers, of which one is pivotally connected with the other lever and pivotally connected with the said actuating rod, and the other lever being mounted to swing on a fixed fulcrum, and a spring-pressed brake lever for stopping the phonograph and adapted to be held in inactive position by the free end of the said other lever and a spring pressing the said other lever.

3. An automatic stop for phonographs, comprising an actuating rod controlled by the tone arm, a trigger having two levers, of which one is pivotally connected with the other lever and pivotally connected with the said actuating rod and the other lever being mounted to swing on a fixed fulcrum, the said lever connected with the actuating rod having a manually controlled handled extension for adjusting one lever relatively to the other, and a spring-pressed brake lever for stopping the phonograph and adapted to be held in inactive position by the free end of the said other lever and a spring pressing the said other lever.

4. An automatic stop including a trigger having two levers, one of which is adjustably mounted on the other, and an actuating rod connected with and controlled by one of the levers to be moved into various positions relatively to the other lever.

5. An automatic stop including a trigger having two levers, of which one is mounted to swing on a fixed pivot, a friction pivot connecting the levers with each other to normally move the levers as a unit and to allow of adjusting the other lever with respect to the first named lever, and an actuating rod connected with the said other lever and adapted to be moved thereby into various positions relatively to the first named lever.

6. An automatic stop for phonographs, comprising a pin on the tone arm, an actuating rod having at one end an upturned arm adapted to be engaged by the said pin, an adjusting lever pivotally connected with the other end of the said actuating rod, a trigger lever fulcrumed on a fixed pivot, a friction pivot connecting the two levers with each other, and a spring-pressed brake lever adapted to be engaged by the free end of the said trigger lever.

7. An automatic stop for phonographs, comprising a pin on the tone arm, an actuating rod having at one end an upturned arm adapted to be engaged by the said pin, an adjusting lever pivotally connected with



the other end of the said actuating rod, a trigger lever fulcrumed on a fixed pivot, a friction pivot connecting the two levers with each other, a brake lever adapted to engage the revoluble platform of the phonograph and having a V-shaped terminal, and a spring adapted to bear against either side of the said terminal.

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Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



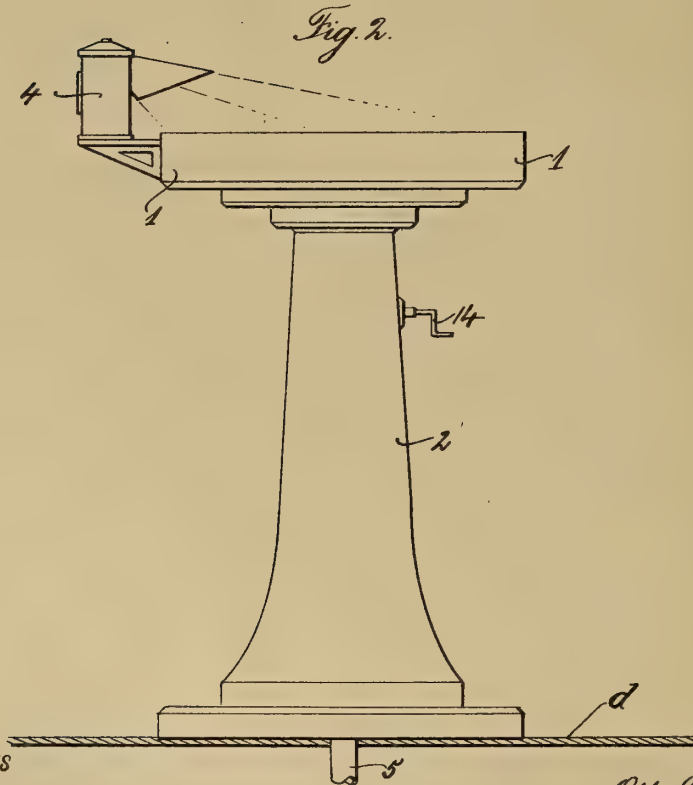
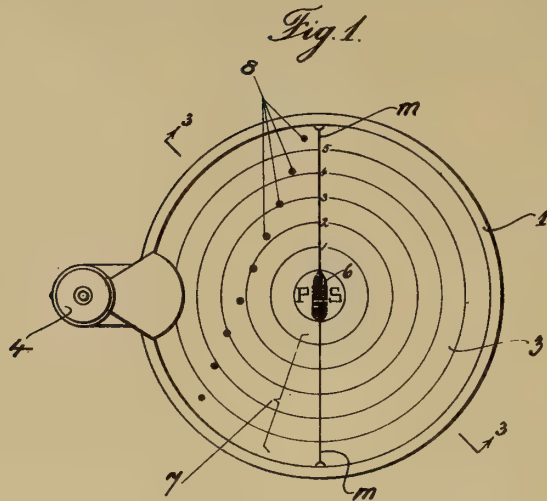
AUTOMATIC FOG SAFETY SHIP'S GUIDE,  
#1,225,796-----O. Fricke,  
Patented-May 15th, 1917.  
Filed-December 2nd, 1914.



O. FRICKE.  
 AUTOMATIC FOG SAFETY SHIP'S GUIDE.  
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 5 SHEETS—SHEET 1.



WITNESSES

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 5 SHEETS—SHEET 2.

Fig. 3.

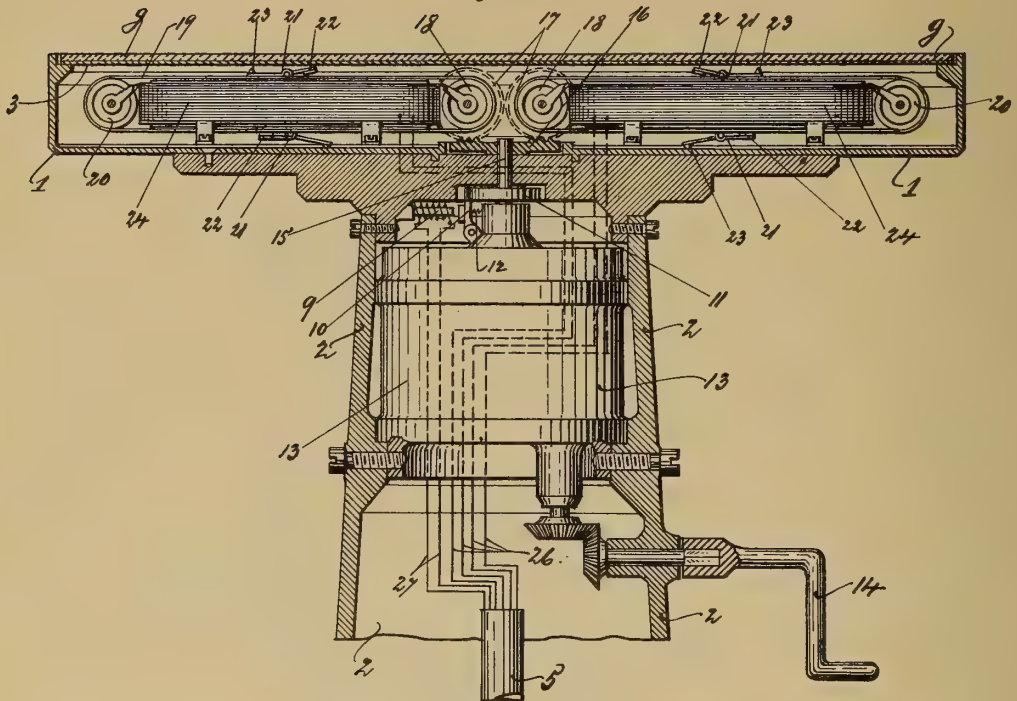
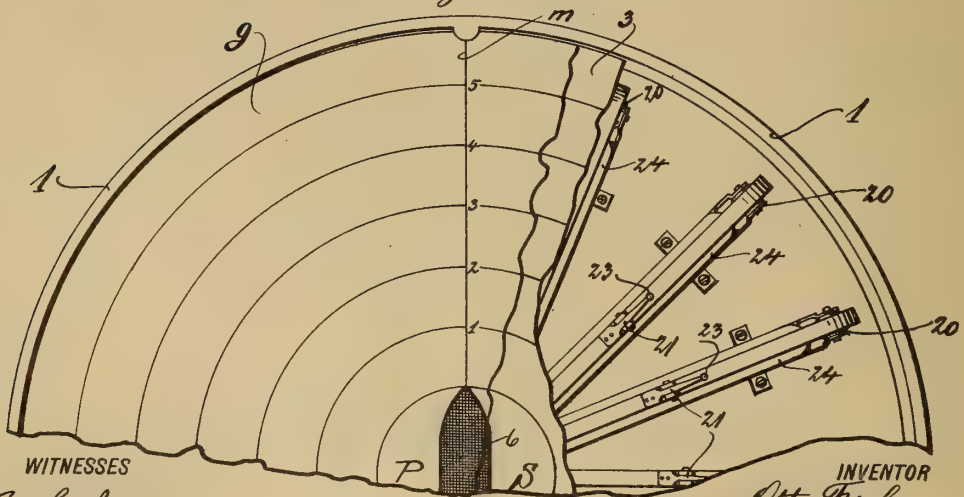


Fig. 4.



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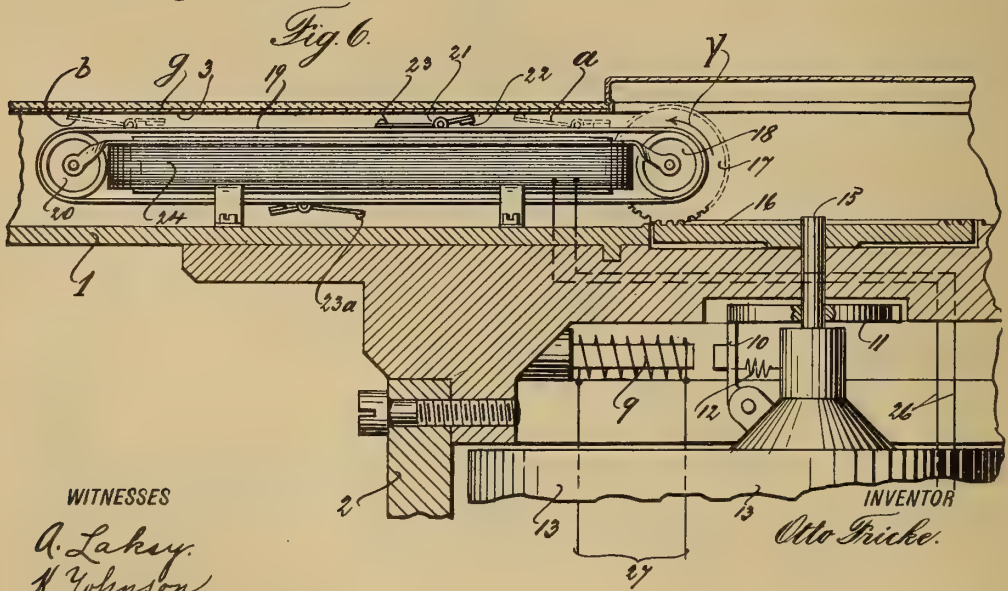
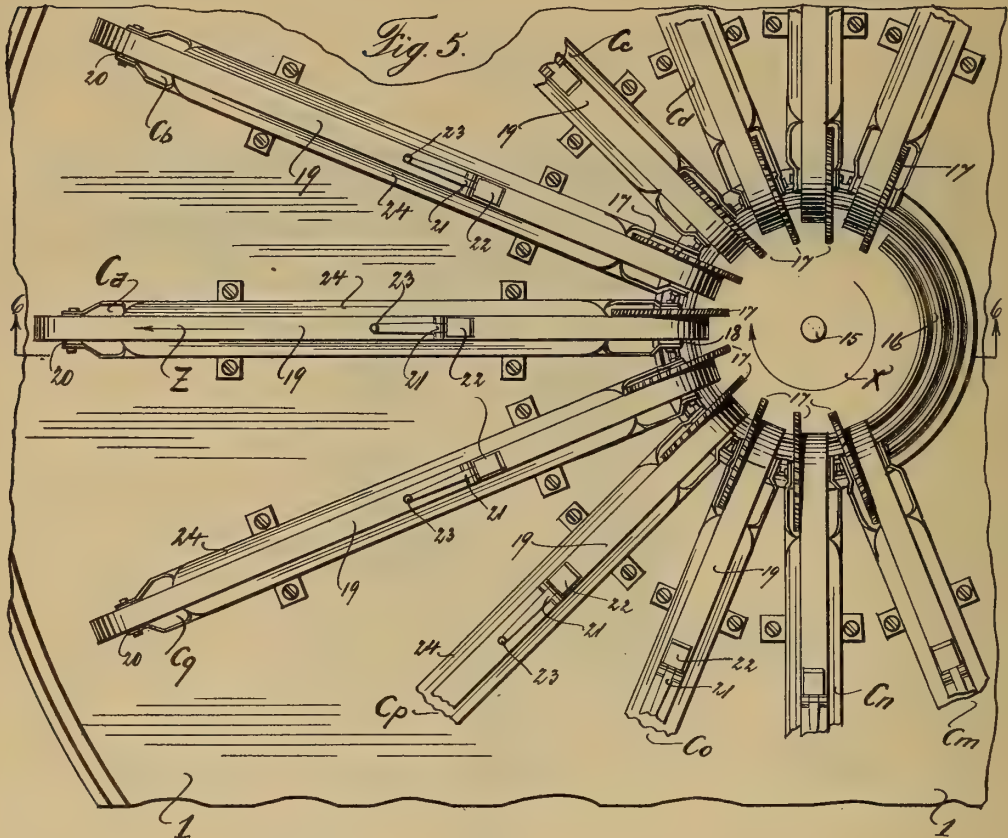




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 5 SHEETS—SHEET 3.



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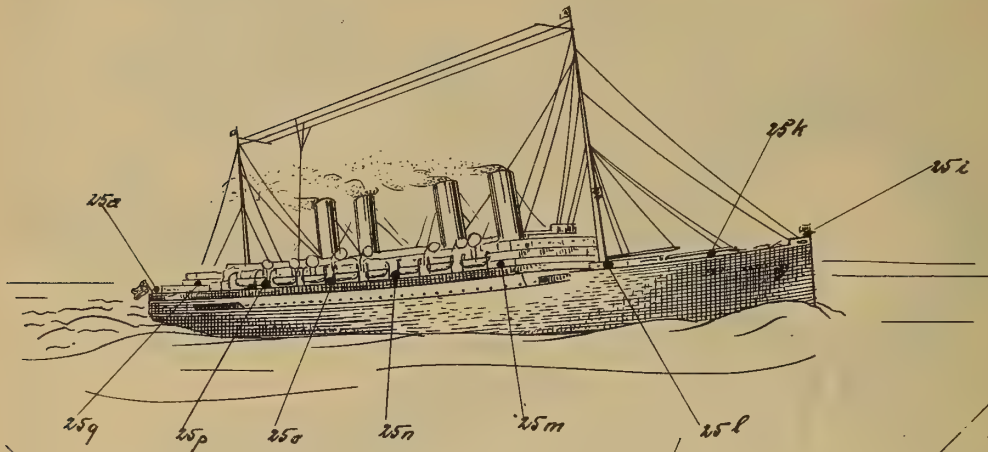


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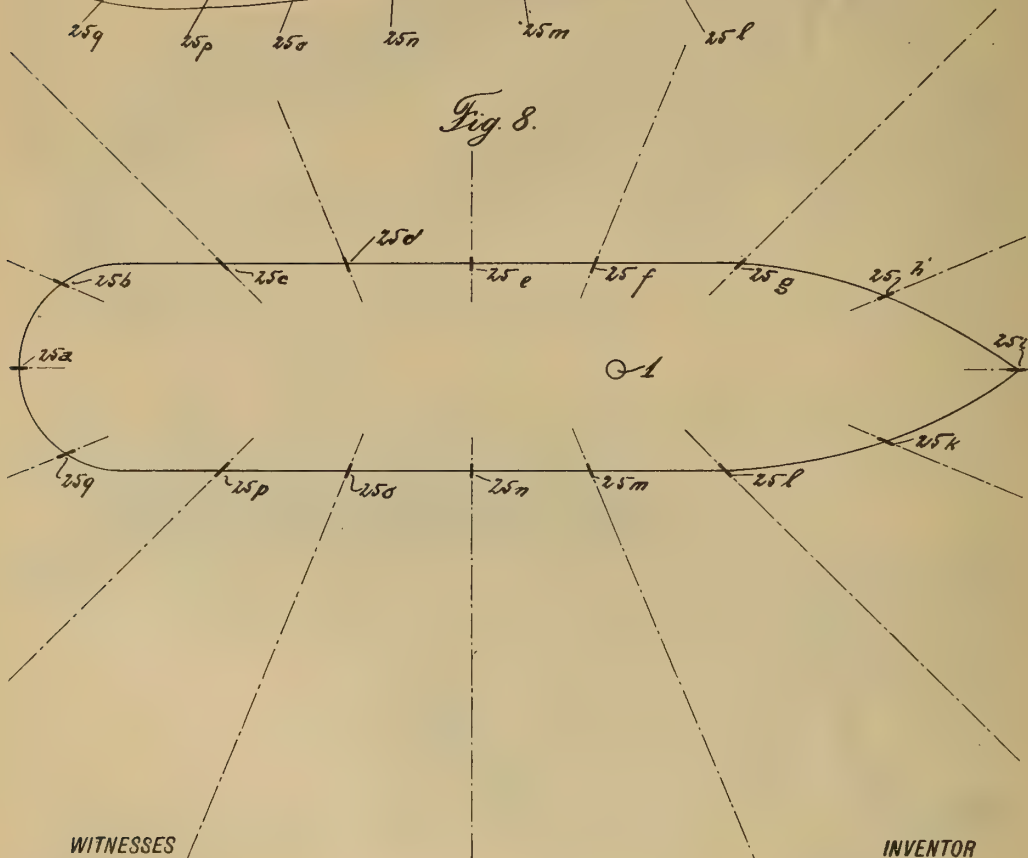
1,225,796.

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 5 SHEETS—SHEET 4.

*Fig. 7.*



*Fig. 8.*



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 5 SHEETS—SHEET 5.

Fig. 9.

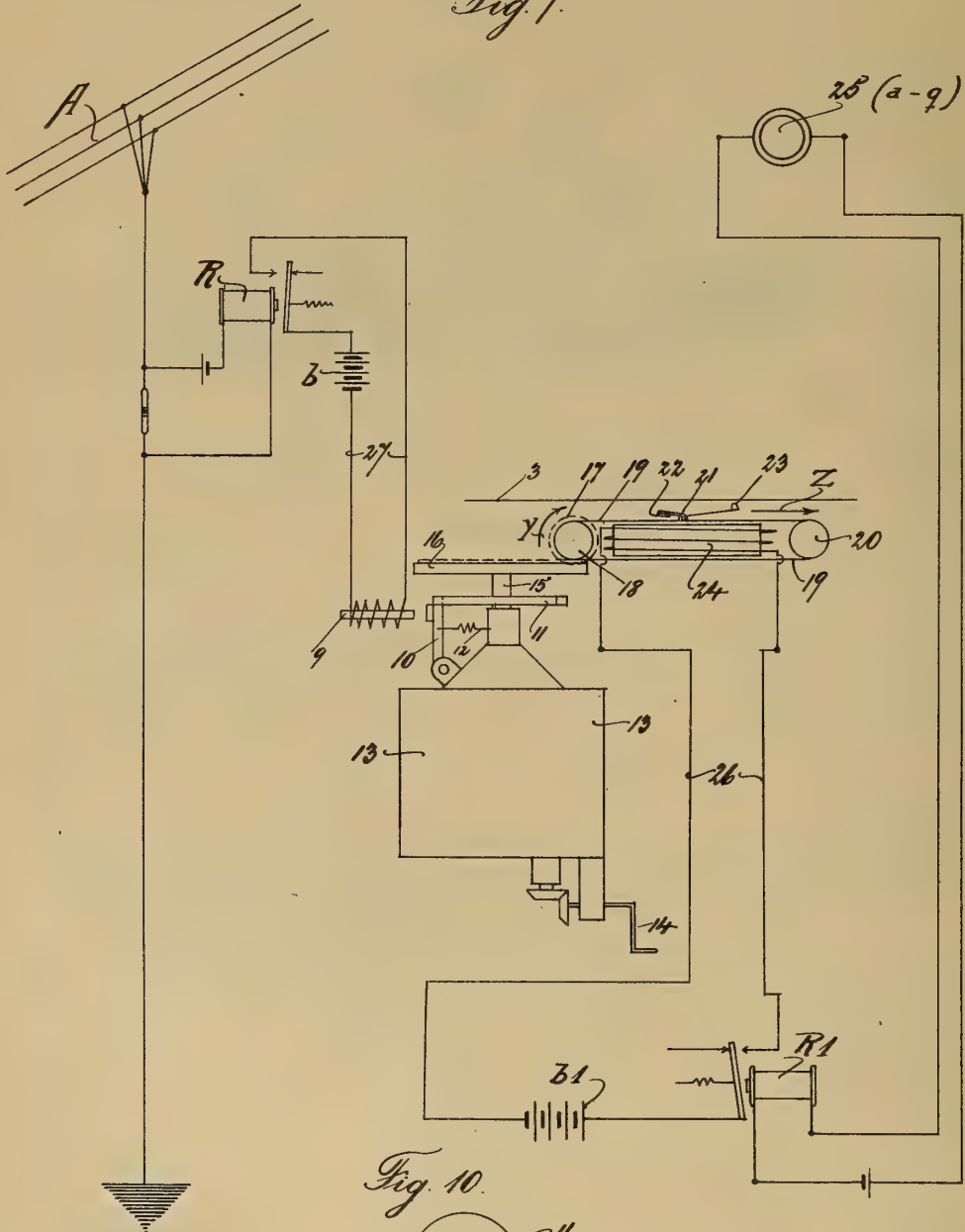


Fig. 10.



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# UNITED STATES PATENT OFFICE.

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AUTOMATIC FOG SAFETY SHIP'S GUIDE.

1,225,796.

Specification of Letters Patent.

Patented May 15, 1917.

Application filed December 2, 1914. Serial No. 875,166.

*To all whom it may concern:*

Be it known that I, OTTO FRICKE, a citizen of the town of Hamburg, Germany, and resident of New York, in the county and borough of Bronx and State of New York, have invented a certain new and useful Instrument—namely, an Automatic Fog Safety Ship's Guide, of which the following is a specification.

The invention is an instrument, which automatically indicates the bearing and the distance of ships in reference to the position of the vessel on board of which such an instrument has been installed.

The majority of accidents on sea are due to impenetrable atmosphere. The important objects of the invention are to render navigation under such circumstances safe, and to produce a permanent record for court inquiry of the ship's relative positions in case of accidents.

To accomplish the above objects, the invention consists in the novel construction, combination, arrangements of parts, and in the combined use of the difference in speed of electricity and sound.

The accompanying drawings form part of this specification. Similar characters of reference indicate corresponding parts in all the views.

Figure 1, is a plan view of the instrument,

Fig. 2, is a side elevation of the same,

Fig. 3, is a partial section taken at line 3—3 in Fig. 1, showing a general arrangement of parts,

Fig. 4, is a partial plan view of Fig. 3,

Fig. 5, is a detailed plan view showing inner parts,

Fig. 6, is a section taken at line 6—6 of Fig. 5 and shows also a modification of the cover "g,"

Fig. 7, is a perspective side view of a steamer, showing proposed location of receiving instruments on board of ship,

Fig. 8, is a diagram of a boat's deck of a vessel, showing proposed location of instruments,

Fig. 9, is a diagram illustrating the electric installations of the invention,

Fig. 10, is a plan view of the locking disk 11.

It is deemed practical to design the instrument as shown in Figs. 1 and 2. The instrument having a table like top 1, the casing, and a hollow footing 2. The latter

is connected in suitable manner to the deck or floor *d* of the ship's pilot house. Part 1 carries a dial 3, Figs. 1, 3, 4 and 6, which is covered by a glass plate *g*, which can be formed as shown in Figs. 3 and 4 or 6. In Fig. 6 the center part of the glass plate *g* is removable, in order to make the interior parts of the instrument readily accessible. The mark 6 (Fig. 1) may be indicated upon this center part.

The dial 3 may if necessary be illuminated by a lamp 4, Figs. 1 and 2. The pipe 5, Figs. 2 and 3, leads the necessary wiring through the footing 2 into the instrument. The upper part of the hollow footing 2 contains a clock work 13, Figs. 3 and 6, which is wound up by handle 14, Figs. 2 and 3.

As shown in Fig. 1, the dial 3 has at its center a permanent mark 6. This mark 6 indicates the position of the ship, on which this instrument has been installed. Hereafter it will be called "our ship." Around this mark 6 numbered circles 7 are arranged. These numbered circles represent distances within radius of our ship. Thus every point indicated on circle 4, Figs. 1 and 4, for instance, represents a point four nautical miles away from our ship. The graduation of dial 3 may be differently arranged and adapted to any other unit of length and it may also be graduated in degrees around the center, thus making it simpler for the navigator to read off and determine the bearing of another ship or object relatively to his. The median line *m* of dial 3, Figs. 1 and 4, represents the course of our ship, and is so arranged that the line *m* is parallel with the axis of our ship. The left side of the median line *m* represents the port side of our ship, and is therefore designated by P, and the starboard side is therefore designated by S, or the circles of dial 3, may also be colored with their respective colors red and green. The dial 3, which is preferably made of transparent paper, is removable and can be kept on file, and if necessary presented to the court in case of investigation. The marks 8 on dial 3 are indicated positions of another ship coming within the zone of the instrument on our ship. From these marks 8 it can be seen, that when the ship first came within the zone of the instrument, she was five and a half, in this case miles, ahead of our ship (Fig. 1). By following

the marks 8 (Fig. 1) which the other ship automatically indicates by her own signals, her course can be traced in respect to ours. It can also be seen that the other ship  
 5 passed ours on the port side with a nearest distance of two miles. These marks 8 result from the combined action of electric wireless and audible signals. It is, however, necessary that the wireless and audible  
 10 signals of the other ship be sent at the same instance. This is done by an electric key of known type, which causes the steam whistle of the vessel to blow, and at the same moment to send a wireless signal "a  
 15 dash." The wireless "dash" is instantly received by the instrument on our ship through the wireless apparatus of the usual type. The instrument being connected by a switch, during impenetrable atmosphere,  
 20 to the wireless apparatus of our ship, in such a way, that the electromagnet 9, Figs. 3, 6 and 9, is operated by the other ship's wireless "dash." The electromagnet when under the influence of electric current, pulls  
 25 the link 10, Figs. 3, 6 and 9, toward itself and thus unlocks the disk 11, Figs. 3, 6, 9 and 10, which is then free to rotate until it is locked again by the link 10 under the action of the spring 12. The disk 11 is  
 30 driven by clock work 13, Figs. 3, 6 and 9, which is wound up with handle 14, Figs. 2, 3 and 9, by the navigator when necessary. While the disk 11, and thus also the axis  
 35 15, Figs. 3, 5, 6 and 9, is rotated by the clock work 13 in the direction of the arrow X shown in Fig. 5, a rotation is also imparted to the gears 17, Figs. 3, 5, 6 and 9, in the direction of the arrow Y, Figs. 6 and 9. Gear 16 is a spiral gear (Figs.  
 40 3 and 6). Gears 17 are connected to pulleys 18, Figs. 3, 5 and 6. These pulleys 18 drive belts 19 in the direction of the arrow Z, Figs. 5 and 9. These belts 19 bear light levers 21, which are preferably  
 45 made of aluminum and carry a soft iron part or armature 22. At the opposite end of the levers tinting points 23, Figs. 3, 4, 5, 6 and 9 are arranged. The space between the runs of the belts 19 is occupied  
 50 by electromagnets 24, Figs. 3, 4, 5, 6 and 9. These magnets 24 are operated by the receiving apparatus 25 (*a-q*) of the audible signals Figs. 7, 8 and 9. The wiring  
 55 27, for releasing the clock work 13, is indicated at Figs. 3, 6 and 9. As shown in Figs. 4 and 5 the movement of the clock work 13, and the transmission of the motion to belts 19, and thus the motion of the  
 60 tinting points 23, is so arranged, that the tinting points or printing points 23 move radially away from the center in proportional speed to the speed at which the sound travels. The distance traversed by the  
 65 printing points 23, in respect to the graduation of dial 3, is proportional to the dis-

tance traversed by the sound, which operates the points 23. The motion of the tinting points 23 is so arranged, that when it has reached its end position the opposite  
 70 tinting point 23<sup>a</sup> (Fig. 6) is in starting position "a" (Fig. 6), until the disk 11 is unlocked again.

Now, then, assuming that on the other ship the fog whistle and the wireless "dash" are given at the same moment, referring to  
 75 Fig. 9, the electric waves sent wireless are received by the antenna A, Fig. 9 and operate the relay R instantly, thus closing the circuit of battery *b*, whose current through  
 80 wiring 27 acts on magnet 9. The consequences are that magnet 9 unlocks by the link 10 the disk 11, which on account of the clock work 13 then rotates together with the spiral gear 16, thus imparting radial  
 85 outward motion to the belt 19 through gear 17 and pulley 18. As the sound travels slower than electricity, the sound of the other steamer's whistle is received later. The instant the transmitter 25 (*a-q*) Fig.  
 90 9, receives said sound, it operates the relay R<sup>1</sup> and thus closes instantly the circuit of battery *b*<sup>1</sup>, whose current acts upon the electromagnet 24, and thus pulls down the iron part or armature 22 of the lever 21, whereby the tinting point 23 is caused to  
 95 leave a mark upon the back side of the paper dial 3. As the motion of 23 started at the instant the other ship gave its signal by wireless and fog whistle, and as the tinting point 23 moves proportional to the speed  
 100 of the sound and plotting a mark when its transmitter receives audible signal, the distance between the starting position "a", Fig. 6, of 23 and the position at which the tinting point 23 plots its mark "b", Fig. 6,  
 105 corresponds to the distance traversed by the sound coming from its source. Thus by means of the graduation of dial 3, the distance of the source of the sound can be read off directly, as the dial 3 is transparent and the marks 8 (Fig. 1) show through  
 110 it from the underside of said dial.

In order to indicate and record the direction from which the audible signal is received, it is proposed to arrange a plurality  
 115 of sound recorders around a center as shown partly in Fig. 5. Each sound recorder is connected to a corresponding sound transmitter, which is preferably installed on the boat deck of the vessel. The planned loca-  
 120 tion of the sound transmitters 25 is shown in Fig. 7 and in Fig. 8. In Fig. 8 the center lines of the transmitters are indicated, and from these it can be seen, that each transmitter takes care of a certain direction  
 125 around the ship. Any audible signal taken up by these transmitters is instantly recorded by the corresponding recorder in the instrument on the dial 3.

The transmitter 25<sup>a</sup>, Fig. 8, for instance 130



operates recorder C<sup>a</sup>, Fig. 5; 25<sup>b</sup>, Fig. 8, operates the recorder C<sup>b</sup>, Fig. 5; 25<sup>c</sup>, Fig. 8, operates the recorder C<sup>c</sup>, Fig. 5; 25<sup>a</sup>, Fig. 8, operates the recorder C<sup>a</sup>, partially shown in Fig. 5; and 25<sup>a</sup>, Fig. 8, operates the recorder C<sup>a</sup>, Fig. 5, and so on. As will be seen from the Figs. 7 and 8, the ship can receive wireless and audible signals from all directions, and by the foregoing the combined action of wireless and audible signals will record on the instrument the distance and the direction or bearing of the object from which those signals have been given.

As it sometimes occurs, especially in crowded waters near important ports, several steamers might signal at the same time during impenetrable atmosphere. The instrument can record any number of distances and courses. It is but advisable to observe the present understanding between seamen, not to signal all at the same time, the same rule being observed by wireless operators.

From the practical standpoint, navigation is rendered safe during impenetrable atmosphere by the use of this instrument on every vessel. Each steamer has by means of said instrument a visible and permanent indication of the other ship's distance and course.

A great benefit upon humanity and a great blessing to mankind will be realized by this safety device.

From the foregoing description taken in connection with the accompanying drawings, the advantage of the construction, operation and the accomplished object of the instrument will be readily understood by those skilled in the art to which the invention pertains, and of which I have described the principle of operation together with the device, which I now consider to be the best embodiment thereof.

I desire to have it understood that the device shown is merely illustrative and that such changes may be made when desired as are within the scope of the appended claims.

I claim:

1. The combination of a sending station, a receiving station, at least one of said stations being in motion, a record receiving member located at the receiving station and means coöperating with said record receiving member, and arranged to be actuated by signals sent coincidentally from the sending station and having different speeds of travel whereby a record visibly indicating the movements of the moving station is produced upon said record receiving member.

2. The combination of a sending station, a receiving station, at least one of said stations being in motion, a record receiving member located at the receiving station and means coöperating with said record receiving

ing member and arranged to be actuated by an electric impulse and the sound waves of an audible signal sent coincidentally with said electric impulse from said sending station whereby a record visibly indicating the movements of the moving station is produced upon said record receiving member.

3. An instrument of the kind described comprising means for receiving an electric impulse, a driving mechanism controlled by said means and adapted to be set in motion as said electric impulse is received, a marking device caused to travel in an inoperative position by said driving mechanism, a chart located in proximity to the path of said marking device and means actuated by sound waves produced by an audible signal sent coincidentally with said electric impulse whereby said marking device is moved from an operative to an inoperative position to produce a mark upon said chart.

4. An instrument of the kind described comprising means for receiving an electric impulse signal, a driving mechanism controlled by said means and adapted to be set in motion as said electric impulse is received, a plurality of endless belts extending radially from a given point and adapted to be actuated by said driving mechanism, marking devices carried by said belts and movable therewith in inoperative positions, a chart located in proximity to the paths of said marking devices and a plurality of means each controlling one of said marking devices and each adapted to be actuated by sound waves produced by an audible signal sent coincidentally with the electric impulse whereby said marking devices are operated to produce marks upon said chart.

5. The combination of a sending station and a receiving station, at least one of which is traveling, a record receiving member located at the receiving station and provided with indications designating distances, and means coöperating with said record receiving member and arranged to indicate the direction of location of one station relatively to the other, said means being operated by signals sent coincidentally from the sending station and having different speeds of travel whereby a record visibly indicating the path of the movable station, its distance from and its direction of location from the other station is produced upon said record receiving member.

6. The combination of a wireless telegraph, a driving mechanism, means operatively connected with said wireless telegraph and adapted to be actuated by electric impulse received thereby whereby said driving mechanism is controlled, a series of endless belts extending in radial directions from a given point and arranged to be actuated by said driving mechanism, pivoted members carried by said belts and movable therewith



in inoperative positions, marking devices carried by said members at one end, armatures carried by said members at their opposite ends, a chart located in proximity to the  
 5 paths of said marking devices, electrically actuated mechanisms coöperating with each armature to individually control said marking devices and a plurality of devices each controlling an individual electric mechanism  
 10 and adapted to be actuated by sound waves produced by audible signals sent coincidentally with said electric impulses whereby each coöperating electric mechanism is operated to actuate the coöperating member  
 15 and marking device to produce a mark upon said chart.

7. The combination of a wireless telegraph, a driving mechanism, means operatively connected with said wireless apparatus and adapted to be actuated by electric impulses received thereby whereby said driving mechanism is controlled, a support for said driving mechanism, a casing carried by said support, a driven member with-  
 20 in said case and operatively connected with said driving mechanism, a plurality of endless belts within said casing and extending in radial directions therein, pulleys journaled in said casing for supporting said  
 30 belts, an operative connection from one pulley of each belt to said driven members whereby said belts are caused to travel lengthwise by said driving mechanism, a graduated transparent dial located above  
 35 and in close proximity to said belts, a transparent face plate carried by said casing above said belts, marking devices carried by said belts in inoperative positions, armatures carried by said marking devices, electro-  
 40 magnets located between the runs of said belts, and devices at a distance from said belts and extending in the same general direction adapted to be actuated by sound waves produced by signals sent coincidentally with the electric impulses and controlling the operation of said electromagnets and armatures whereby said marking devices are actuated to produce marks upon the said transparent dial from below.

8. The combination of a sending station, a receiving station, at least one of said stations being in motion, and an apparatus located at the receiving station and including a record receiving member and record  
 55 producing means coöperating therewith, said apparatus being arranged to be actuated by signals sent coincidentally from the sending station and having different speeds of travel whereby a record visibly indicating the movements of a moving station is produced upon said record receiving member.

9. The combination of a sending station, a receiving station, at least one of said stations being in motion, a record receiving  
 65 member located at said receiving station,

and a plurality of movable marking devices coöperating with said record receiving member and adapted to be set in motion by electric impulses sent from said sending stations and subsequently actuated by the  
 70 sound waves of audible signals sent coincidentally with said electric impulses from said sending stations whereby a record visibly indicating the relative positions of the sending and receiving stations is produced upon said record receiving member.

10. The combination of a sending station, a receiving station, at least one of said stations being in motion, a record receiving member located at said receiving station, a plurality of movable marking devices controlled by signals sent coincidentally from the sending station and coöperating with said record receiving member to produce a record visibly indicating  
 80 the relative positions of the sending and receiving stations upon said record receiving member and mechanism controlled by said signals sent from the sending station and arranged to move said marking devices  
 90 in directions opposite to the directions traveled by the signals from said sending stations.

11. An instrument of the kind described comprising a record-receiving member having a point indicating a receiving station thereon, and means coöperating with said record receiving member and arranged to be operated by signals sent coincidentally from a given point and having different  
 95 speeds of travel whereby a record is produced upon said record receiving member in correlation to said point thereon visibly indicating the relative positions of the sending and receiving points.

12. An instrument of the kind described comprising a record receiving member provided with indications designating distances, and means coöperating with said record receiving member and arranged to be operated by signals sent coincidentally from a given point and having different  
 110 speeds of travel, said means being arranged to indicate the direction of location of the sending point whereby a record visibly indicating the direction of location of the sending point relatively to the receiving point and the distance separating said points is produced upon said record receiving means.

13. An instrument of the kind described comprising a record receiving member provided with indications designating distances, a traveling marking device coöperating with said record receiving member  
 125 and arranged to be operated by signals sent coincidentally from a given point and mechanism for moving said marking device at a speed in predetermined ratio to the speed of the slowest traveling signal whereby a  
 130

record visibly indicating the relative positions of the sending and receiving points and the distance traversed by the signal is produced on the record receiving member.

5 14. An instrument of the kind described comprising a record receiving member, a plurality of movable marking devices controlled by signals sent coincidentally from a given point and having different speeds of  
10 travel, said signals cooperating with said record receiving member to produce a record visibly indicating the relative positions of the sending and receiving points upon said record receiving member and mechanism  
15 for moving said marking devices in directions opposite to the directions traveled by said signals from said given point.

15 15. An instrument of the kind described comprising a record receiving member having a point indicating a receiving station thereon, a marking device cooperating with

said record receiving member, driving mechanism arranged to actuate one of said elements relatively to the other, and means controlling said mechanism, said means and  
25 said marking device being arranged for actuation by signals sent coincidentally from a sending station and having different speeds of travel whereby said driving mechanism is released and said marking device is operated to produce a visible record upon said  
30 record receiving device in correlation to the point thereon whereby the relative positions of the sending and receiving stations are visibly indicated. 35

Signed at New York in the county and borough of Bronx and State of New York this twenty first day of July, A. D. 1914.

OTTO FRICKE.

Witnesses:

LAWRENCE JOFFE,  
A. LAKSY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





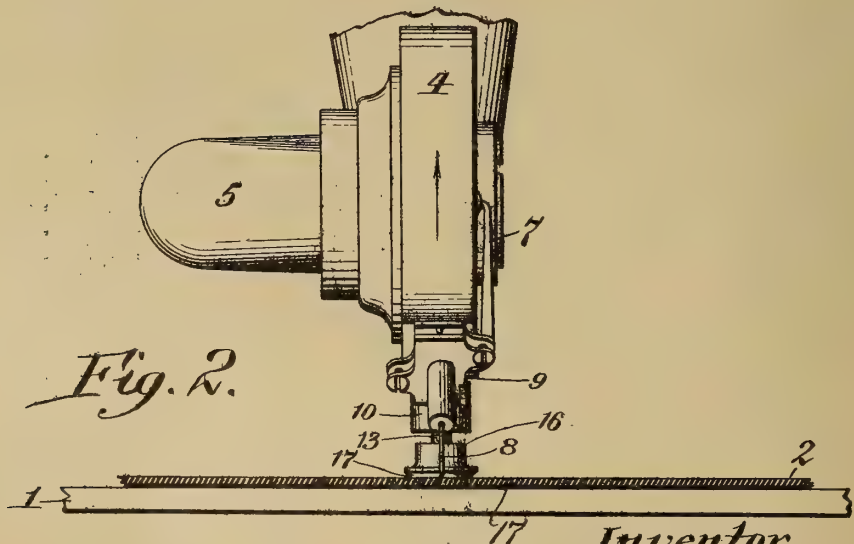
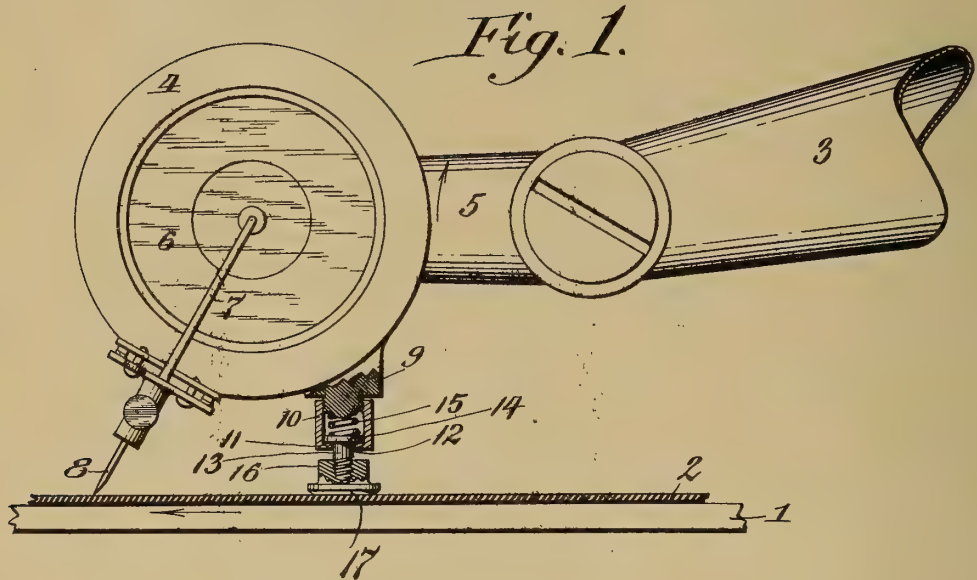
PHONOGRAPH RECORD CLEANER AND  
LUBRICATOR,

#1,225,847-----C. Palmer,  
Patented-May 15th, 1917.  
Filed-May 6th, 1916.

C. PALMER.  
 PHONOGRAPH RECORD CLEANER AND LUBRICATOR.  
 APPLICATION FILED MAY 6, 1916.

1,225,847.

Patented May 15, 1917.



Inventor  
 Charles Palmer  
 By *Super & Pott*  
 Attorneys.

# UNITED STATES PATENT OFFICE.

CHARLES PALMER, OF BUFFALO, NEW YORK.

PHONOGRAPH-RECORD CLEANER AND LUBRICATOR.

1,225,847.

Specification of Letters Patent. Patented May 15, 1917.

Application filed May 6, 1916. Serial No. 95,899.

*To all whom it may concern:*

Be it known that I, CHARLES PALMER, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Phonograph-Record Cleaners and Lubricators, of which the following is a specification.

This invention relates to a device for automatically cleaning and lubricating the sound grooves of a phonograph playing record.

The object of the invention is to provide a wiping and oiling device for sound producing and receiving machines which will properly lubricate and also remove the grit from the portion of the playing record which is to be engaged an instant later by the vibrating or sound needle of the machine.

A further object is to provide an automatically operating device which will permit of readily removing or replacing a playing record on the machine, which will be strong and durable, which may be readily cleaned and oiled and which may be produced at low cost.

In the accompanying drawings:

Figure 1 is a side elevation of a fragmentary sectional elevation of a phonograph equipped with my invention. Fig. 2 is a front elevation of the same.

Similar characters of reference indicate corresponding parts in both views.

1 represents a horizontally rotatable turn table upon the upper side of which a disk-shaped phonograph record 2 is adapted to be removably supported, said table and disk to be turned together by any suitable operating means and the surface of the record being provided with the usual tone producing grooves, lines or indentations.

Above the turn table is arranged the tapering tone tube or hollow arm 3 such as is customarily employed in phonographs and which is pivotally mounted on the stationary frame, not shown, of the machine, so as to swing in a horizontal plane.

Pivotally connected to the forward end of said tone arm, so as to swing in a vertical plane, is a gooseneck or sound box tube 5 which is capable of rising and falling freely relative to said tone arm. Secured to the forward end of said gooseneck is a sound box 4 of the usual and well known form and on one side of this box is mounted a diaphragm

6. Pivoted on the lower part of said sound box is a vibrating lever 7 which is operatively associated at its upper end with said diaphragm.

Detachably secured to the lower part of said lever 7 is a tracing needle 8 whose lower pointed end is adapted to engage with the sound grooves that are arranged spirally in the upper surface of the phonograph record 2. As the tone arm 3 is gradually carried across over the upper side of said phonograph record, the tracing needle engages with the sound grooves of the record. The foregoing parts may all be of usual and well known construction and my improvements which cooperate therewith are preferably constructed as follows:

Mounted on the lower rear portion of the sound box is a vertically depending lug 9 which is preferably arranged longitudinally in line with the needle and which is provided with an external screw thread at its lower end. Mounted upon said lug is a guide sleeve 10 provided on the upper part of its bore with an internal screw thread engaging with said thread of the lug 9. The lower end of said sleeve is provided with a horizontal head 11 having a vertical guide opening 12. Moving loosely up and down in said opening is the stem 13 of a plunger which is provided at its upper end with a head 14. The plunger is yieldingly forced downwardly by a vertical compression spring 15 interposed between the upper side of the head 14 and the lower face of the depending lug 8. Onto the lower end of the plunger stem 13 is screwed a supporting shoe 16 whose lower surface is provided with a pad or wiper 17 of felt or other soft material which in the operative position of the sound box and needle rests on the record immediately in front of the latter.

As the phonograph playing record rotates with its turn table, the felt wiper 17 will brush off the grit and dust from the record in advance of the needle. This pad is preferably soaked with a suitable lubricating oil or substance so as to lubricate the grooved surface of the record as the pad rests upon the latter while in motion. By this means the record is not only cleaned but the wear on the same is reduced to a minimum and the objectionable noise caused by the friction of the constant rubbing of the needle against the moving face of the record materially lessened. It will be noted that the



compression spring 15 relieves the needle of a large part of the dead weight of the sound box 4 so that the wear of the needle on the record is still more reduced. Such a cleaning and lubricating device is not confined, of course, to a disk phonograph or to any one type of disk phonographs but may be used on any sound apparatus where a needle moves in the sound groove of an impression record, the one relatively to the other. Furthermore, the cleaner and lubricator may be otherwise supported although in the preferred construction shown, the cleaning and oiling of the felt pad is most convenient by reason of the fact that it may be readily thrown back with the sound box so as to present the lower rubbing surface of the pad or wiper upwardly.

By loosely fitting the plunger or guide rod in the guide sleeve and interposing a spring between the plunger and sound box the pad can swivel or tilt and change its position for adapting the same to the surface of records which may vary in thickness and

the pad can also bear yieldingly against the record and accommodate itself to the length of the needle resting on the record.

I claim as my invention:

A phonograph comprising a needle adapted to engage a record, a sound box on which said needle is mounted, and a cleaning device mounted on said box and comprising a supporting lug depending from the box and provided with a screw thread, a guide sleeve having a thread at its upper end which engages with the thread of said lug and having a head at its lower end which is provided with a guide opening, a plunger having a guide rod arranged in said opening and a head at its upper end arranged in said sleeve, a spring arranged in said sleeve between said head and said lug, and a shoe having a screw connection with the lower end of said rod and provided on its underside with a felt pad adapted to rest on said record.

CHARLES PALMER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

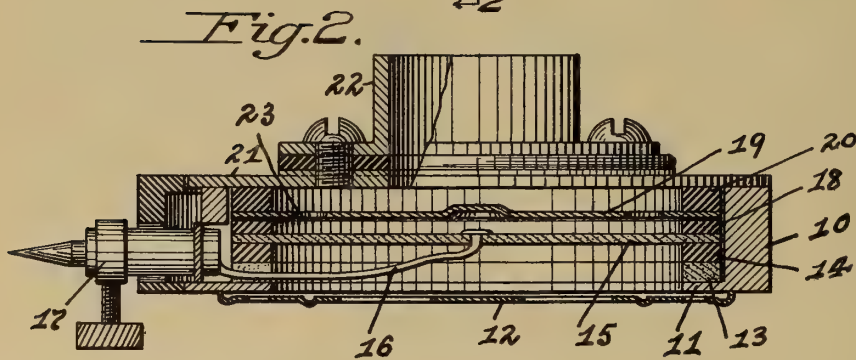
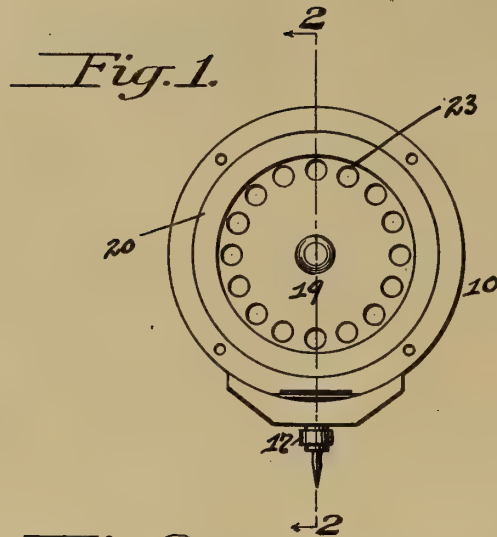
SOUND BOX FOR SOUND REPRODUCING  
MACHINES,

#1,226,262-----P. Rudert,  
Patented-May 15th, 1917.  
Filed-January 31st, 1917.

P. RUDERT.  
SOUND BOX FOR SOUND REPRODUCING MACHINES.  
APPLICATION FILED JAN. 31, 1917.

1,226,262.

Patented May 15, 1917.



*Witnesses:*  
*F. E. Broderick.*  
*J. M. Geoghegan.*

*Inventor:*  
*Paul Rudert,*  
*By J. N. Cooke*  
*Attorney.*



# UNITED STATES PATENT OFFICE.

PAUL RUDERT, OF TARENTUM, PENNSYLVANIA.

SOUND-BOX FOR SOUND-REPRODUCING MACHINES.

1,226,262.

Specification of Letters Patent.

Patented May 15, 1917.

Continuation of application Serial No. 26,020, filed May 5, 1915. This application filed January 31, 1917.  
Serial No. 145,624.

*To all whom it may concern:*

Be it known that I, PAUL RUDERT, a citizen of the United States, and a resident of Tarentum, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Sound-Boxes for Sound-Reproducing Machines; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention pertains to sound boxes for sound reproducing machines and the like. It is the principal object of the invention to improve upon the tonal qualities of the sound reproduced by such instrument.

A sound box constructed in accordance with my invention is described, by way of example, in the following specification, and shown in the accompanying drawing, in which—

Figure 1 is a front view of a sound box having the front plate and horn receiving tube removed, thereby to disclose the intermediate diaphragm; and

Fig. 2 is a section taken longitudinally through the sound box, the front plate and horn receiving tube being shown in elevation. The section is taken as on the line 2—2 of Fig. 1.

Referring to the drawing, the sound box comprises a cylindrical open-ended casing 10, having an inwardly extending flange 11 at its rear end. The open rear end of the casing 10 is covered by an ornamental perforated plate 12. Upon the flange 11 are placed a pair of annular washers 13 and 14, respectively, the washer 14 bearing the vibratory diaphragm 15 which may be of any of the well known constructions. To the center of the diaphragm 15 is connected a needle bar 16, which is connected to a suitably mounted needle socket 17. Like the diaphragm, the needle bar and needle socket may be of any of the well known constructions.

Upon the periphery of the vibratory diaphragm 15 is placed an annular washer 18, and upon this, in turn, is placed a disk 19. Upon the periphery of the disk 19 is placed an annular washer 20, the latter being of such dimensions as to extend slightly

beyond the front end of the casing 10. The projecting edge of the washer 20 is engaged by a front plate 21 which is secured, in any suitable way, to the casing 10. This front plate 21 is apertured at its center and carries a tube 22 of the character ordinarily used for being connected to the horn extension, or swinging arm, of a gramophone or other sound reproducing machine. It will be seen that, when the front plate 21 is secured in place, it will clamp the disk 19 and diaphragm 15 firmly in position between their respective washers.

The disk 19 is made sufficiently heavy not to be capable of material vibration and is imperforate, except at points near its periphery where it is provided with a plurality of holes 23. I have found that by the provision of a disk, such as the disk 19, intermediate the vibrating diaphragm and the central sound-exit opening of a sound box, which disk is provided with openings adjacent its periphery, the tonal qualities of the sound reproduced by the device are much improved and corrected.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

A sound box for talking machines or the like, comprising a cylindrical casing having a sound-exit opening disposed centrally of one end thereof, a diaphragm carried by said casing, means for transmitting vibrations to said diaphragm, said transmitting means being attached solely to the center of said diaphragm, a disk on the side of said diaphragm toward said opening, said disk being substantially parallel with said diaphragm and being spaced a material distance therefrom and from said end, and said disk being imperforate at and adjacent its center and being formed with apertures adjacent the periphery thereof.

In testimony whereof, I the said PAUL RUDERT, have hereunto set my hand.

PAUL RUDERT.

Witnesses:

A. D. P. MILLER,  
J. N. COOKE.



RECORD CABINET,

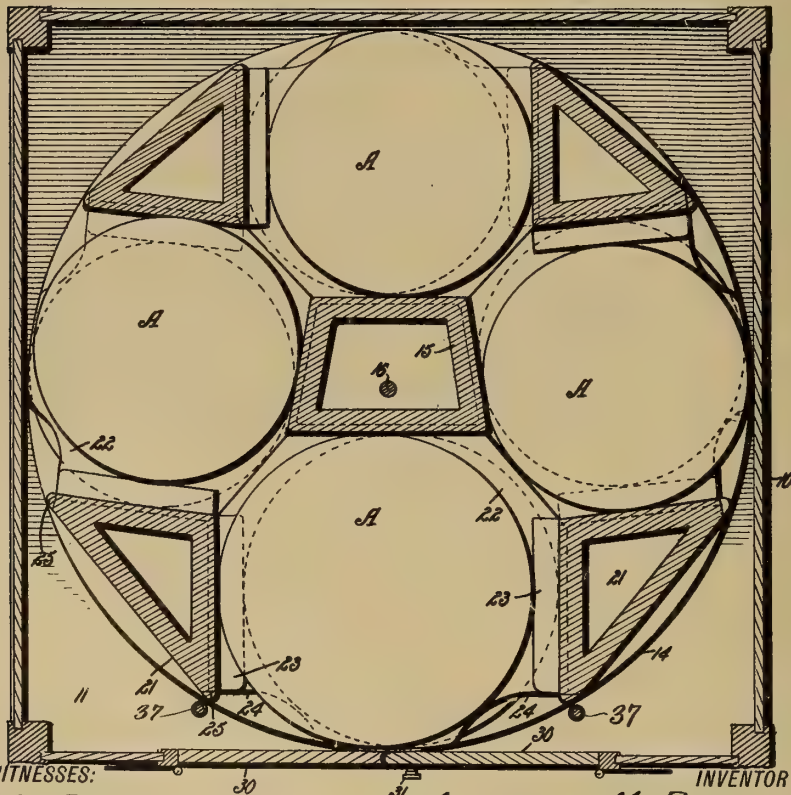
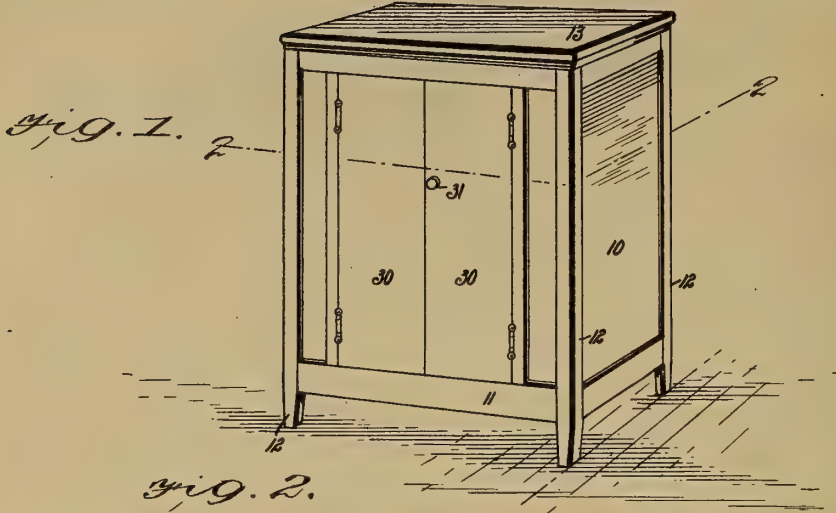
#1,226,301-----A. M. Brexendorf,  
 Patented-May 15th, 1917.  
 Filed-March 14th, 1916.



A. M. BREXENDORF.  
 RECORD CABINET.  
 APPLICATION FILED MAR. 14, 1916.

1,226,301.

Patented May 15, 1917.  
 3 SHEETS—SHEET 1.



WITNESSES:

*J. C. Parry*  
*L. M. Willett*

INVENTOR

ALEXANDER M. BREXENDORF

BY

ATTORNEYS



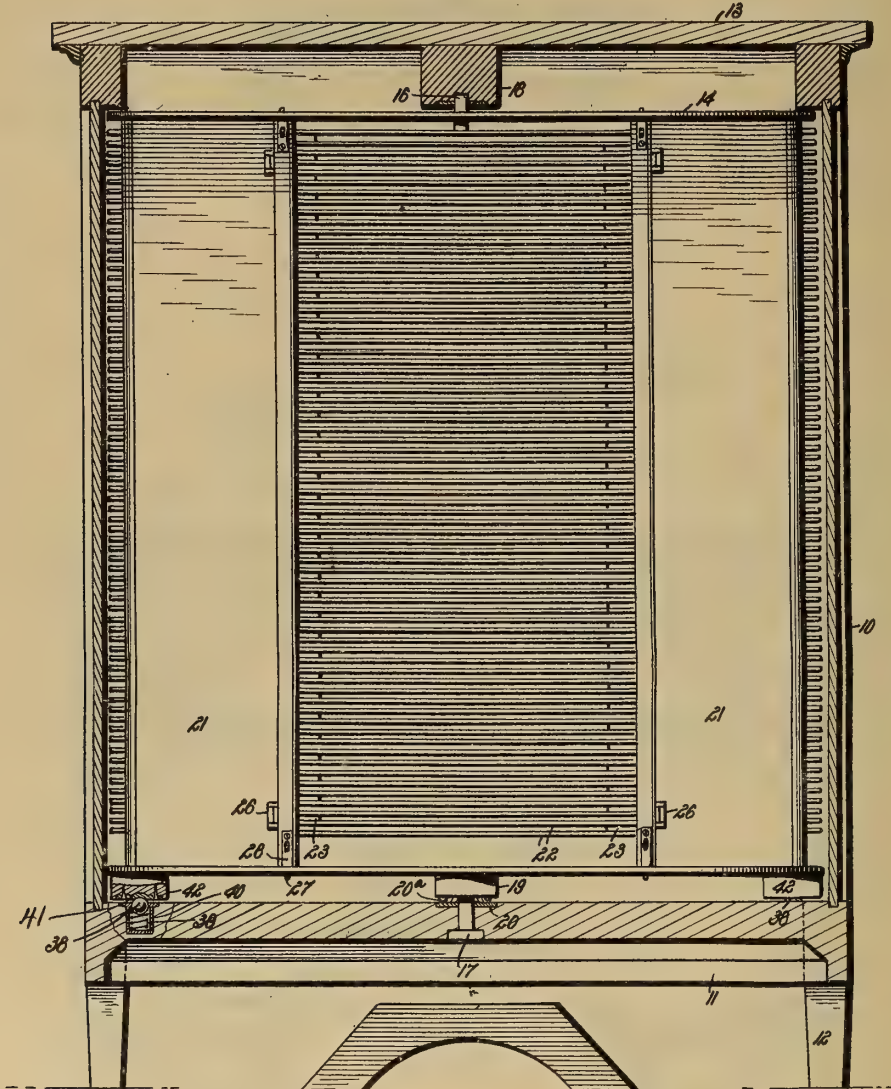
A. M. BREXENDORF.  
 RECORD CABINET.  
 APPLICATION FILED MAR. 14, 1916.

1,226,301.

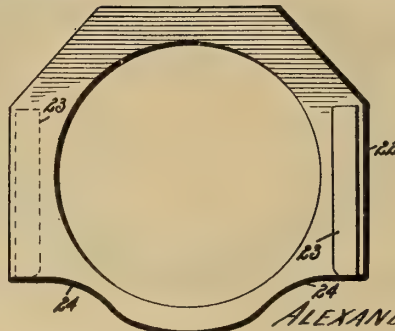
Patented May 15, 1917.

3 SHEETS—SHEET 2.

*Fig. 3.*



*Fig. 4.*



WITNESSES:

*L. C. Barry*  
*L. M. Muliff*

INVENTOR

*ALEXANDER M. BREXENDORF*

BY

*Attorneys*

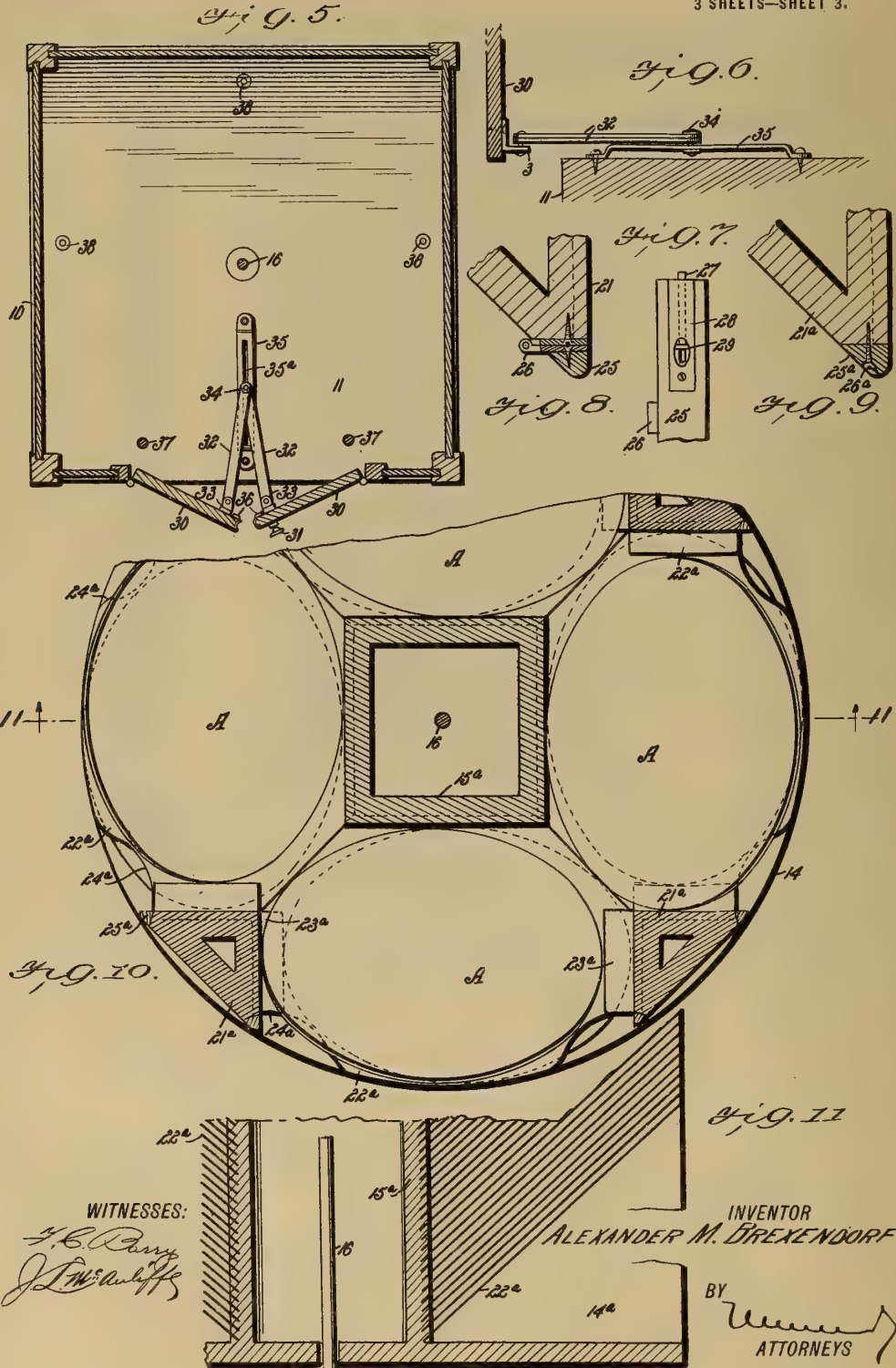




A. M. BREXENDORF.  
 RECORD CABINET.  
 APPLICATION FILED MAR. 14, 1916.

1,226,301.

Patented May 15, 1917.  
 3 SHEETS—SHEET 3.



WITNESSES:

*F. B. Barry*  
*J. L. W. Ruliff*

INVENTOR

ALEXANDER M. BREXENDORF

BY

ATTORNEYS

# UNITED STATES PATENT OFFICE.

ALEXANDER MAX BREXENDORF, OF CARLISLE, PENNSYLVANIA.

## RECORD-CABINET.

1,226,301.

Specification of Letters Patent.

Patented May 15, 1917.

Application filed March 14, 1916. Serial No. 84,066.

*To all whom it may concern:*

Be it known that I, ALEXANDER M. BREXENDORF, a citizen of the United States, and a resident of Carlisle, in the county of Cumberland and State of Pennsylvania, have invented a new and Improved Record-Cabinet, of which the following is a full, clear, and exact description.

My invention relates to a cabinet for holding the disk records of talking machines and in which the records are held in a plurality of vertical series, the holder being mounted to turn on a vertical axis to bring any particular series of records to the front of the cabinet.

The general object of the invention is to provide a cabinet having a large holding capacity and in which provision is made for so holding the records as to permit of their removal with facility.

More particular objects of the invention are to provide an improved cabinet having shelves formed with cut-outs and having a staggered arrangement of separating strips whereby to dispose successive records in a vertical series with edge portions positioned to be readily grasped at the cut-outs of the respective shelves; to provide a novel means for causing the opening of both cabinet doors by the opening of one of said doors; to provide a means whereby the records will be properly forced to position without injury should they be left protruding from the shelves; and to provide novel friction stops to arrest the turning movement of the revolving holder so that the holder may be readily stopped with the series of records presented at the front of the cabinet.

The invention also has for an object to improve cabinets of the indicated class in various particulars as to strength and simplicity and whereby particular shelves may be removed when desired, and other parts of the cabinet removed for repair or renewal.

Reference is to be had to the accompanying drawings forming a part of this specification in which similar reference characters indicate corresponding parts in all the views.

Figure 1 is a perspective view of a record cabinet constructed in accordance with my invention;

Fig. 2 is an enlarged horizontal section on the line 2—2, Fig. 1;

Fig. 3 is a transverse vertical section;

Fig. 4 is a plan view of the shelves;

Fig. 4<sup>a</sup> is an edge view of two shelves showing the same separated in the interest of clearness;

Fig. 5 is a sectional plan view of the cabinet taken on a horizontal line adjacent to the bottom or floor of the cabinet;

Fig. 6 is a detail in vertical section showing the means for causing the cabinet doors to open in unison;

Fig. 7 is a fragmentary face view of one of the strips or cleats employed for removably retaining the shelves;

Fig. 8 is a horizontal section showing the said shelf-retaining cleat in connection with a fragment of the revolving holder;

Fig. 9 is a view similar to Fig. 8 but illustrating a modified means for securing the shelf-retaining cleat in position;

Fig. 10 is a fragmentary horizontal section illustrating a modified arrangement of the shelves;

Fig. 11 is a fragmentary vertical section on the line 11—11, Fig. 10.

The cabinet 10 is preferably formed rectangular provided with a bottom 11, framed to the sides of the cabinet and to the posts 12 in a manner to permit the bottom to be removed when desired, for repairs. The numeral 13 indicates the top of the cabinet.

Within the cabinet 10 and mounted to revolve on a vertical axis, is a holder 14 which includes a preferably hollow center post 15 through which extends a spindle 16 having a head 17 at the bottom, said spindle, in practice, being inserted through the bottom of the cabinet and upwardly through the holder 14, the upper end of the spindle turning in a bearing block 18 on the under side of the top 13. A block 19 on the holder 14 at the under side turns on a bearing plate 20 on the bottom 11 at the spindle 16, ball bearings 20<sup>a</sup> being preferably provided between said elements 19 and 20.

Besides the center post 15, side posts 21 are provided on the holder 14, their number being according to the number of vertical series of records A to be accommodated, there being four of such vertical series and therefore four of the posts 21, in the illustrated example. Between the respective posts, 15, 21, a series of shelves 22 are provided, the shelves being formed as in Figs. 4 and 4<sup>a</sup> to present edge portions that fit



grooves in the adjacent sides of the said posts 15 and 21. The shelves are separated by spacing strips 23, alternate strips being staggered so that the successive records A in a vertical series will thus be received on the shelves in a manner to overlap, thereby presenting edge portions of the records alternately at the cut-outs 24 formed in each shelf 22 at the front at the opposite sides of the shelf. In this way, a particular record may be readily grasped at the cut-out portion of the shelf and the record thus removed with facility. In practice, the strips 23 at the front ends thereof will bear numbers corresponding with the numbers of the record index for readily locating the particular record.

To permit the removal of the shelves when desired for repairs or renewal, cleats 25 are provided, said cleats being best shown in Figs. 7 and 8, in which it will be seen the cleat is hinged to a post 21 by hinges 26. To retain the cleat in position a bolt 27 is provided at the top and bottom of the cleat 25 and arranged to have vertical movement beneath a keeper plate 28 and provided with a finger-piece 29, whereby the bolt may be slid vertically to release the same from engagement with the top and bottom of the holder 14.

In the form shown in Figs. 9 and 10, the shelf-retaining cleat 25<sup>a</sup> is fastened by screws 26<sup>a</sup> to the side posts 21<sup>a</sup>.

In the form of holder shown in Figs. 10 and 11, the shelves 22<sup>a</sup> of the holder 14<sup>a</sup>, corresponding essentially in shape with the shelves 22, are inclined so as to dip toward the center post 15<sup>a</sup>, whereas in the form shown in Figs. 1 to 3, the shelves are horizontal. In both cases the adjacent sides of the center post 15 or 15<sup>a</sup> limit the inward movement of the records A.

I provide swing doors 30 on the front of the cabinet 10 and as seen in Figs. 5 and 6, means is provided whereby the swinging of one door by grasping the knob 31 thereof, will serve to swing both doors. The means comprises links 32 pivotally connected at their outer ends to brackets 33 on the doors 30 near the bottom, the inner ends of the said links 32 being pivotally connected, as at 34, which pivot extends into a slot 35<sup>a</sup> in a metal strip 35, which is suitably fastened to the upper surface of the bottom 11 of the cabinet. At the inner sides near the opposed edges of the doors felt strips 36 are secured to contact with a record A should the latter be left slightly protruding, whereby to press the said record properly into place on its shelf. To further insure that any protruding record will be gently moved into proper position on its shelf, I provide vertical rods 37, which, in practice, will have a soft surface-ing material and which will engage any protruding records as the holder 14 is turned.

To retard the turning movement of the holder 14 on its spindle 16, I provide friction stops 38 consisting of balls supported on springs 39 in pockets 40 formed in the bottom 11 of the cabinet, the said balls yieldingly engaging against wear plates 41 on blocks 42, secured to the under side of the holder 14. Thus, the holder will have a tendency to stop at the open front of the cabinet and will not have a tendency to swing a particular series of records A past the front opening.

The arrangement in the holder 14 of the side posts provides for grooves at the two side faces of each post to receive the adjacent series of shelves, while the corners or angles formed by the said side faces and the outer face, provide for the employment of the cleats 25 in a manner to constitute in effect, removable corner members of the posts as distinguished from additional cleats, and thus the character of the cleats in retaining the shelves, and themselves being detachable for the removal of the shelves, is not obvious in the general finished appearance of the holder.

It is to be understood that the shelves may be of any suitable material and, in the case of metal shelves, they will have suitable soft covering to prevent scratching of the disks.

Having thus described my invention, I claim as new, and desire to secure by Letters Patent:

1. A record cabinet including a record holder mounted to turn on a vertical axis, a series of shelves on said holder, said shelves having cut-outs at opposite sides at the front of each shelf, and staggered spacing members between said shelves at the side edges thereof to position the records with edge portions alternately disposed at the respective cut-outs of the shelves.
2. A record cabinet including a vertical series of shelves and fixed members interposed between the shelves, alternately at opposite side edges thereof, thereby presenting between the shelves overlapping record-receiving spaces within the cabinet between the respective members and the opposite wall of the cabinet into and out of which spaces the records are movable between the said spacing members and the said opposite walls.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

ALEXANDER MAX BREXENDORF.

Witnesses:

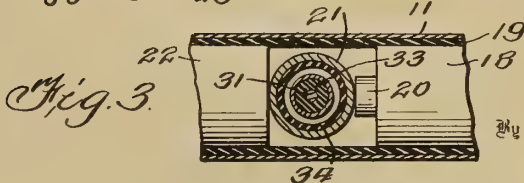
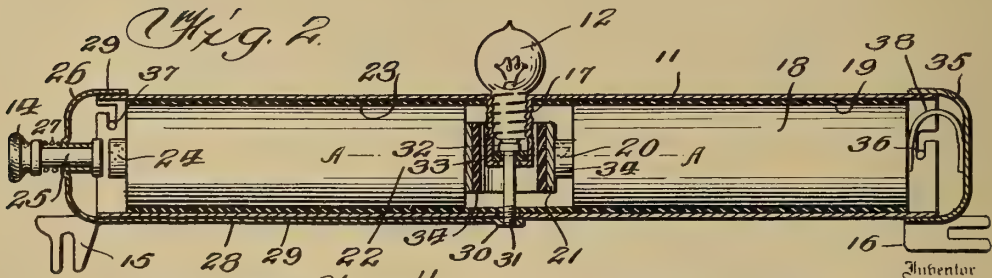
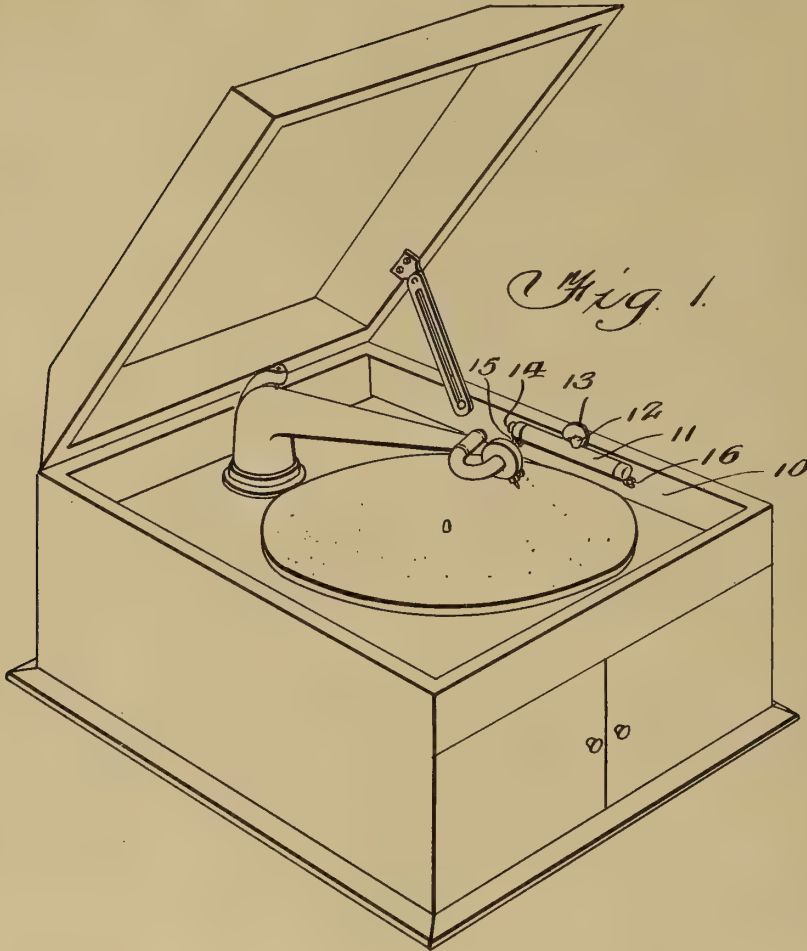
H. W. DOYLE,  
W. H. CRIDER.

PHONOGRAPH LAMP,  
#1,226,607-----P. Gillen,  
Patented-May 15th, 1917.  
Filed-February 19th, 1917.

P. GILLEN.  
 PHONOGRAPH LAMP.  
 APPLICATION FILED FEB. 19, 1917.

1,226,607.

Patented May 15, 1917.



Paul Gillen  
 Hugo Wock  
 his

Inventor

Attorney



# UNITED STATES PATENT OFFICE.

PAUL GILLEN, OF LYNBROOK, NEW YORK, ASSIGNOR TO HUDSON BRASS WORKS IN THE CITY OF NEW YORK, OF BROOKLYN, NEW YORK, A CORPORATION OF NEW YORK.

## PHONOGRAPH-LAMP.

1,226,607.

Specification of Letters Patent. Patented May 15, 1917.

Application filed February 19, 1917. Serial No. 149,508.

*To all whom it may concern:*

Be it known that I, PAUL GILLEN, a citizen of the United States, residing at Lynbrook, in the county of Nassau and State of New York, have invented certain new and useful Improvements in Phonograph-Lamps, of which the following is a specification.

This invention relates to electric flash lights and more particularly to that class of electric flash lights which are used for the purpose of giving a temporary or sustained illumination to the face of a phonograph record for the purpose of illuminating the phonograph needle and record so as to permit the correct positioning of the needle upon the record without injury to either.

A further object of this invention is to provide a phonograph lamp for the purpose specified which can be economically constructed, easily attached in its proper place upon the phonograph box and which can be easily operated for the purpose specified.

A further object is to provide a phonograph lamp which will be light in weight and which can be attached to and detached from the phonograph without damage to the phonograph box.

With these and other objects in view the invention consists of certain novel features of construction, combinations and arrangements of parts as are more fully hereinafter described and pointed out in the claims.

In the accompanying drawings.

Figure 1 is a view in perspective showing the device attached to a phonograph,

Fig. 2 is a vertical section showing the parts of the device in detail, and

Fig. 3 is a horizontal section showing the lamp connections and insulation on the line A—A of Fig. 2.

The parts of the device shown in detail in the drawings are as follows:—

10 represents the ordinary talking machine cabinet to which my device is attached by means of the brackets 15 and 16, the brackets being so shaped that the lamp can be readily lifted off the cabinet when desired. 11 is the outer casing of the lamp made of metal and preferably polished or nickel plated to present an attractive appearance. 12 is the incandescent light. 13 is a small adjustable reflector placed in back of the same so as to direct the light upon

any part of the record. 14 is a push-button in circuit which is held out of contact with the terminal 24 by the spring 27. 17 is a metallic socket joined to and secured in the outer casing 11. 19 and 23 are the insulating members separating the outer casing 11 from the metallic coverings and terminals of the batteries 18 and 22. 20 and 24 represent equivalent terminals of the batteries 18 and 22, the two batteries being connected by the metallic ring 21 more fully shown in Fig. 3. 25 is a movable contact carried by the push-button 14. 26 and 35 are metallic caps secured to the respective ends of the outer casing 11. 28 is a metallic connector from the cap 26 to the connecting head 30, the screw 31 and the head making contact with the lamp 12. 33 and 34 are insulating rings more fully shown in Fig. 3. 36 and 37 are bayonet slot connections provided to permit the recharging of the batteries. 38 is a spring clip joining the members 35 and 36 and completing the circuit.

The operation of the device is as follows:—

When it is desired to operate the lamp, pressure upon the push-button 14 closes the circuit with the terminal 24, the current being conducted through the cap 26 along the connector 28 to the head 30, screw 31 and inner terminal of the lamp. The current then is conducted through the socket 17 to the casing 11, then to the cap 35, through the clip 38 to the outer terminal of the battery 18, through the battery to the terminal 20 which is joined in series to the outer terminal of the second battery 22 by means of the metallic connecting ring 21, thus completing the circuit. I am aware that previously, lamps have been constructed for the purpose of illuminating the needle of the phonograph but I believe that I have shown herein a lamp for this purpose which is simple in construction, convenient to operate and may be attached and detached without tampering with the delicate parts of the phonograph itself.

Various changes may be made in the general form and arrangement of the parts without departing from the spirit of my invention and hence I do not limit myself to the precise construction herein shown.

Having thus described my invention, what

I claim as new and desire to secure by Letters Patent is:—

1. In a lamp, the combination of a cylindrical casing, dry batteries placed in series  
5 therein, an incandescent light secured within said casing between said batteries, a metallic ring connecting opposite terminals of said batteries and inclosing the socket of  
10 said lamp, and movable contact means for completing the circuit between said lamp and said batteries.

2. In a lamp, the combination of a cylindrical casing, dry batteries placed in series  
15 therein, an incandescent light secured within said casing between said batteries, a metallic ring connecting opposite terminals of said batteries and inclosing the socket of said lamp, a metallic connector connected to  
20 the inner terminal of said lamp and insulated from the cylindrical metallic casing

and movable contact means for completing the circuit between said connector and said batteries.

3. In a phonograph lamp, the combination of a cylindrical casing, dry batteries placed in series therein, an incandescent light secured within said casing between  
25 said batteries, a metallic ring connecting opposite terminals of said batteries and inclosing the socket of said lamp, spring contact means for completing the circuit between  
30 said lamp and said batteries, brackets secured to the ends of said cylindrical casing to permit same to be positioned on a phonograph box and means for reflecting the light  
35 from said lamp on any portion of the phonograph record.

In testimony whereof I hereunto affix my signature.

PAUL GILLEN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

CENTERING DIRECTOR FOR RECORD  
DISKS,

#1,226,674-----J. M. W. Kitchen,  
Patented-May 22nd, 1917.  
Filed-March 6th, 1916.

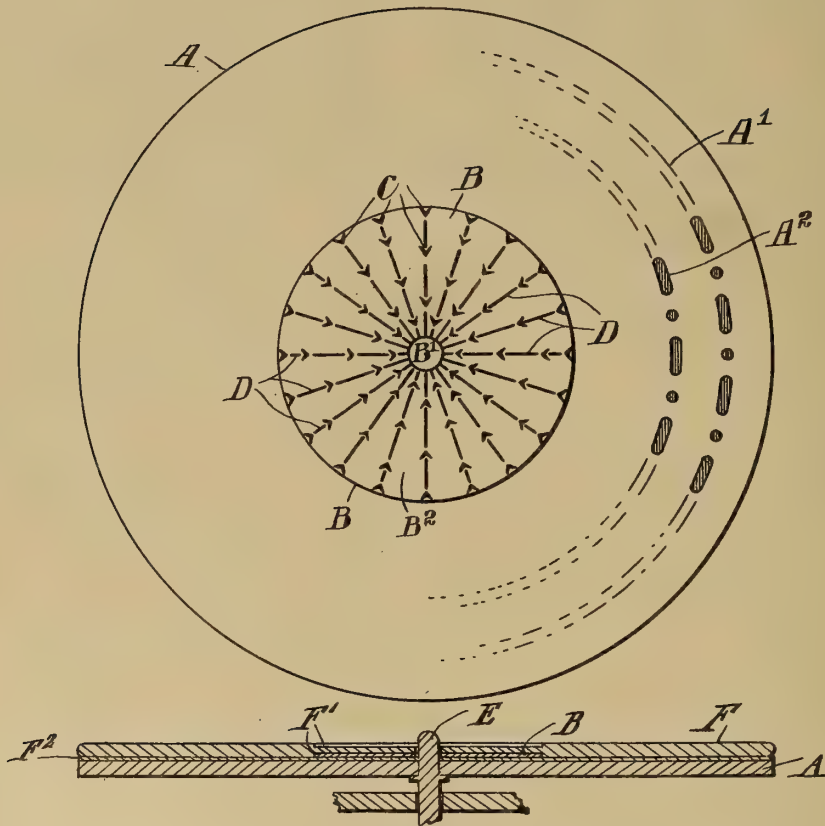


J. M. W. KITCHEN.  
 CENTERING DIRECTOR FOR RECORD DISKS.  
 APPLICATION FILED MAR. 6, 1916.

1,226,674.

Patented May 22, 1917.

*Fig. 1.*



*Fig. 2.*

Attest:  
*C. Mitchell*  
*A. Richardson*

Inventor:  
*J. M. W. Kitchen*  
 by *Geo. F. Wheelock*  
 Atty

# UNITED STATES PATENT OFFICE.

JOSEPH MOSES WARD KITCHEN, OF EAST ORANGE, NEW JERSEY.

## CENTERING-DIRECTOR FOR RECORD-DISKS.

1,226,674.

Specification of Letters Patent.

Patented May 22, 1917.

Application filed March 6, 1916. Serial No. 82,335.

*To all whom it may concern:*

Be it known that I, JOSEPH MOSES WARD KITCHEN, a citizen of the United States, residing in the city of East Orange, county of Essex, State of New Jersey, have invented an Improvement in Centering-Directors for Record-Disks, of which the following is a specification.

The object of this invention is to facilitate the placing of record-disks on the retaining and centering shaft projection of the revolving horizontal turn-table of so-called "talking" machines. As is known, it is frequently difficult in placing an opaque record-disk on its turn-table, to at once bring the perforation in the center of the record-disk, over the centering and retaining shaft projection, inasmuch as there is no reliable and satisfactory visual means of directing the movement of the disk to the exact centering point of the turn-table, which is the center of the retaining shaft projection.

This invention overcomes that difficulty by at once informing the eye as to the centering direction in which to move the disk to bring the perforation of the disk directly over the centering shaft projection. In accomplishing this aim, I prefer to have lines and pointers drawn on the frictional pad of, or upper surface of the machine's turn-table, or on a removable thin plaque of uniform thickness resting on the turn-table, but having the lines and pointers on the plaque, and radiating from the central point of the turn-table shaft extending outwardly from the periphery of the shaft in all directions for a sufficient distance. Along the radiating lines I indicate by arrow heads or other forms of pointers, the central direction in which the record disk should be immediately moved to arrive at the position for imposition of the perforation of the record disk onto the centering shaft projection. I also sometimes indicate by circularly placed marks or lines on the frictional pad's surface of the turn-table, placed at the same distance from the center of the turn-table, as would be the peripheries of the record-disks, showing how the record-disks should be placed. Some of the turn-tables which are used for revolving record-disks are of the same diameter as the diameter of some record-disks, but some record-disks are larger than the turn-table used, while others are smaller. Hence, I preferably provide both methods for indicating the position of the centering shaft projections,

both those immediately adjacent to the centering retaining shaft, and those which circumferentially indicate the position of the disks when in use. It is obvious that if the periphery of the record disk is the same as the circumferential indicating marks, the juxtaposition of the two would indicate the position of the center point of the turn-table's axial shaft. These markings may be placed on the felt or other surface pad of the turn-table, or partly on that surface pad and partly upon a removable thin disk or plaque placed upon and centered by the platform pivot. Or, they may be on only one removable centering disk-director plaque.

Centering directing marks, such as I may use, I indicate in the accompanying drawing; in which, Figure 1 is a plan view of the upper surface of a talking machine turn-table with a central directional plaque in position; and Fig. 2 is a vertical cross sectional view of Fig. 1 taken through its center, and having an ordinary record-disk in position; and A is the periphery of a talking machine turn-table; and A<sup>1</sup> and A<sup>2</sup> are circumferential indicating marks representing the emplacement position of disks of different diameters. B represents a removable centering plaque or disk, and also, an imprintment immovably attached to the turn-table pad; B<sup>1</sup> is the perforation of the disk or plaque indicator. B<sup>2</sup> is the dark colored background on which the centering indicating marks, lines, and directing pointers are affixed; C are the pointers indicating the direction of the turn-table's projecting shaft; and D are radiating lines to be followed in arriving at the centering point for placing the record-disk. In Fig. 2, E is the centering projecting axial shaft of the turn-table. F is a record-disk in position; F<sup>1</sup> is the usual, centrally placed, depression found in a record-disk, and F<sup>2</sup> is the frictional turn-table pad. It is obvious that with the use of my device in almost whatever position the perforation of the record-disk may be first placed in relation to the center point, a pointing indicator and leading line will be at once seen through the disk perforation, which if followed along any of the lines in the direction indicated by the pointers, the centering point will be quickly found.

Inasmuch as in placing a record disk in position, very little light gains access between the record-disk and the machine plat-



form, and as the central perforation in the record-disk is usually quite small for the entrance of light, an important part of the invention is in providing strongly contrasting 5 unharmonious colors in the body surface of the indicating disk B, and in the directing pointers C and lines D; so that these pointers and lines may easily be visually perceived when they, as is usual, are poorly 10 lighted. I prefer to provide a black back ground, and a brilliant yellow gilt for the indicating lines and direction pointers; but green and white, yellow and blue, or other markedly contrasting colors may be used.

15 As has before been stated, these centering directing pointers and lines may be imprinted upon the surface of the turn-table pad, although that usually has a poor printing surface; but in case the centripetal 20 means of direction is removable, I prefer that it should be of thin sheet metal, coated with baked enamel in proper colors; though paper, cloth, leather or other material can be used for this purpose. The upper sur- 25 face of the indicating disk plaque preferably should not have any coloring or imprinting on it to interfere with the directorial functional purpose of the disk plaque; but the under surface can be imprinted and 30 decorated in any desirable manner, giving directions how to use the disk, its trade name, manufacturer, etc.

In case a removable centrally placed disk is used, it will have a diameter suitable to 35 fit in the depressed center which is usually formed in record-disks, and on which are imprinted the title of the record, etc. It is obvious that this central part of the record-disk may have perforations, which will further facilitate the seeing of the indicating 40 marks through the admission of more light through the record disk; though it is usually preferable to have the entire record-disk integrally of one material in order to 45 increase the strength of the record-disk.

The marks and lines on the means I use in directing record-disks to their seat, are preferably so intermitted as to continuity 50 as to allow of their imposition on the means through the use of a stencil. If there is stenciling on the surfacing frictional material composing the pad, I may use a stenciling fluid that will chemically change the color of the surfacing felt or other material 55 on the platform. The invention comprises any method of applying permanently directorial marks on the turn-table, including lines adhering to or integral with the

turn-table below or not much above the level of the frictional covering, and which 60 might be seen through a perforation or perforations of the frictional covering of a suitable size. Or, the directorial means may be set into a perforation in the frictional material, or it may be placed over or upon the 65 frictional material. In any case, it is preferable that the directorial indicator shall not have its surface touch any part of the surface of the record-disk, in which case the revolution of the record-disk would be still 70 effected by contact with all of the outer areas of the frictional material covering the turn-table as is at present commonly the case.

Having now disclosed the nature of the invention, what I claim as new is: 75

1. The combination with a talking machine turn-table having a projecting axial shaft for centering a centrally perforated record-disk, of means for visually directing the centering and placing of record-disks on 80 the projecting shaft, which means is located on the exposed upper surface of said turn-table in close juxtaposition to said shaft and leading thereto and pointing to the center of said shaft. 85

2. The combination with a talking machine turn-table having a projecting axial centering shaft, of a removable centering indicator having lines and pointers leading to and pointing to the center of said indi- 90 cator and said shaft, said lines and pointers on said indicator, when said indicator is in position, starting from the external periphery of said indicator and extending to the external periphery of said shaft. 95

3. In a centering indicator for facilitating the emplacing of a record-disk on the centering and retaining means of a talking machine turn-table, a flat disk-plaque having a centering perforation and interrupted lines 100 and indicating pointers in the interruptions, and extending from the circumferential surface-areas of the disk-plaque to approximately said centering perforation.

4. In a centering indicator for a talking machine turn-table having a centering 105 means, directing means pointing to the center of said centering means of the turn-table from a plurality of directions with respect to said centering means and extending 110 to a position closely in apposition with said centering means.

JOSEPH MOSES WARD KITCHEN.

Witnesses:

GEO. L. WHEELOCK,  
BEATRICE MIRVIS.



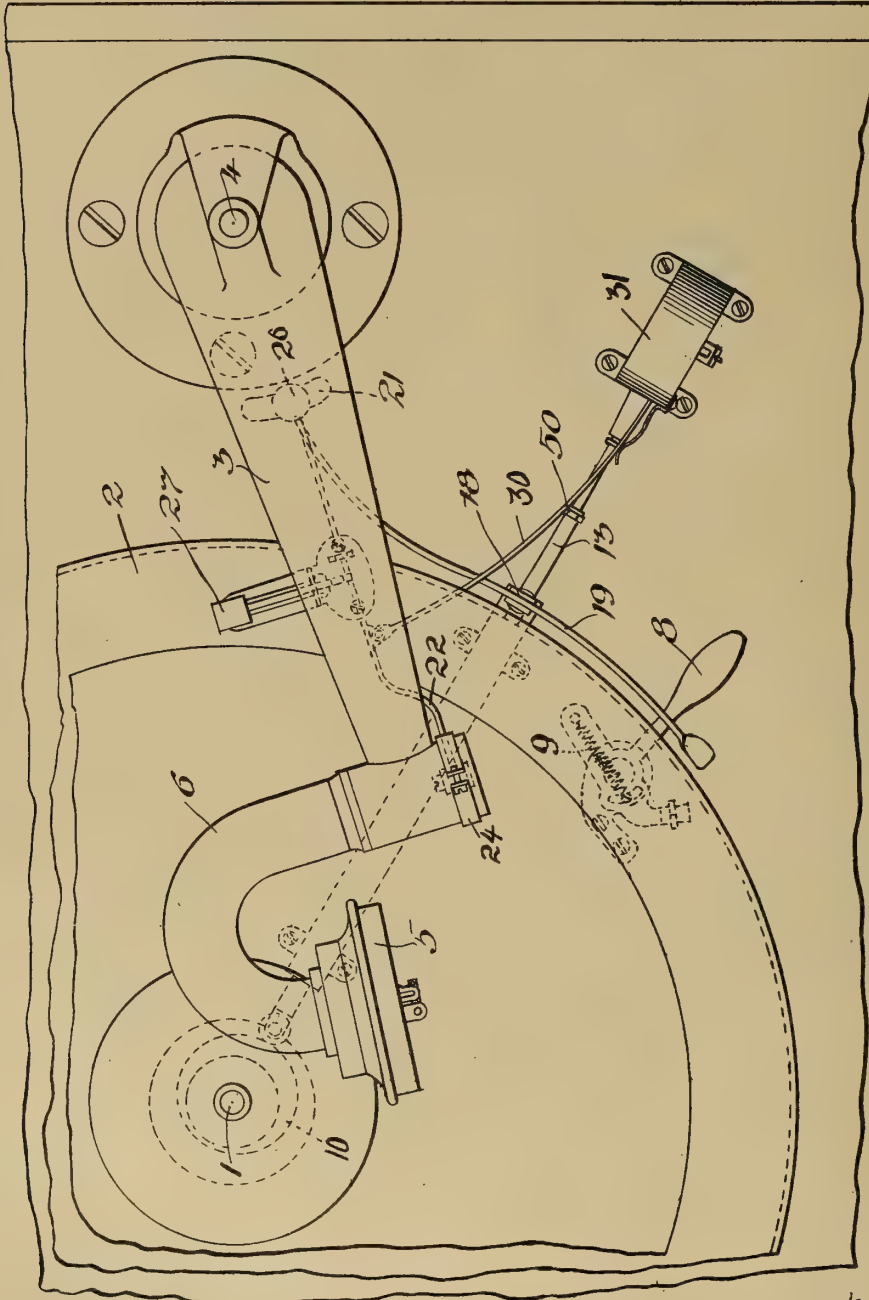
AUTOMATIC STOPPING DEVICE FOR GRAPHOPHONES,  
#1,226,749-----Clarence Cate,  
Patented-May 22nd, 1917.  
Filed-April 5th, 1915.

C. CATE.  
 AUTOMATIC STOPPING DEVICE FOR GRAPHOPHONES.  
 APPLICATION FILED APR. 5, 1915.

1,226,749.

Patented May 22, 1917.  
 3 SHEETS—SHEET 1.

Fig. 1.



Inventor:  
 C. Cate  
 By Chamberlain, Townsend &  
 Attorneys

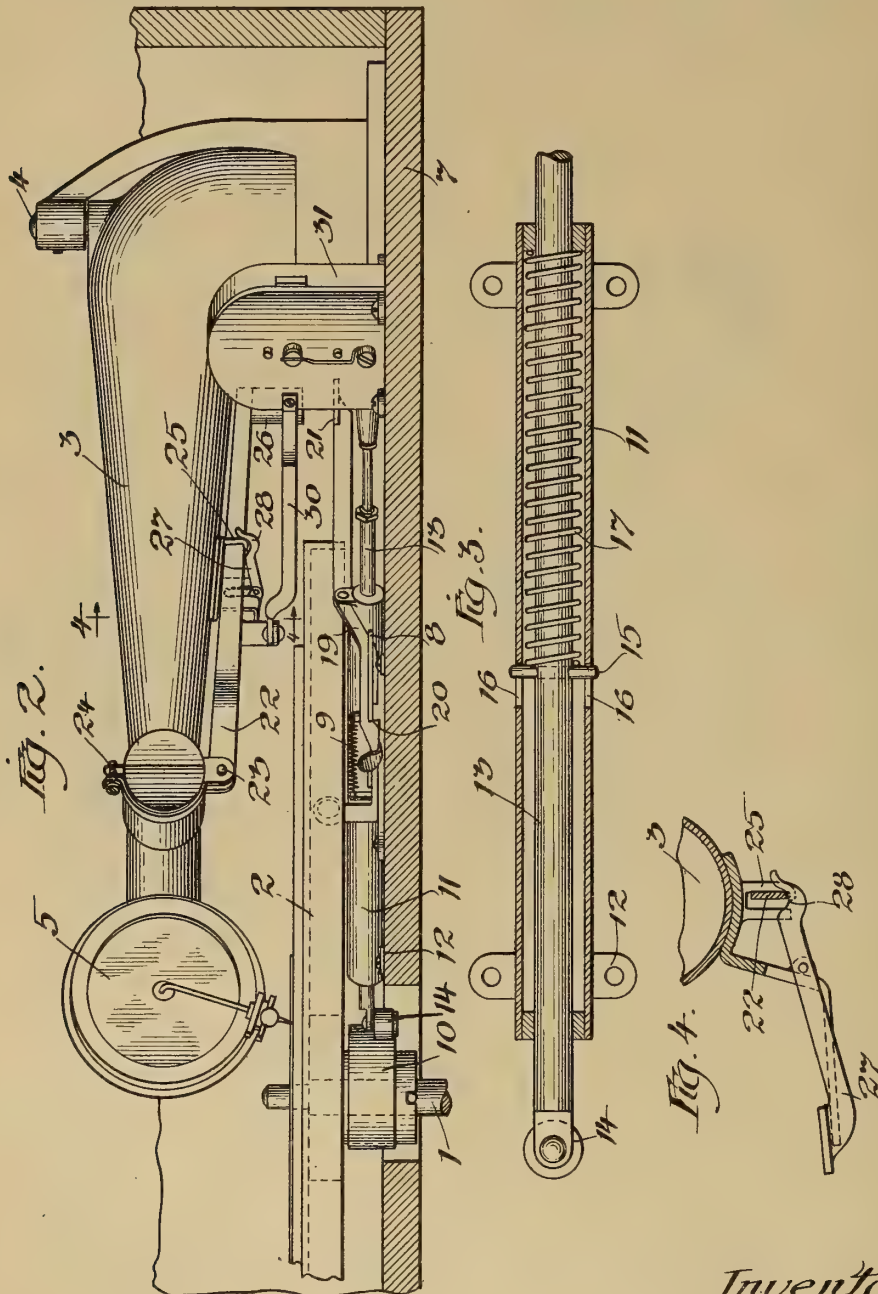




C. CATE.  
 AUTOMATIC STOPPING DEVICE FOR GRAPHOPHONES.  
 APPLICATION FILED APR. 5, 1915.

1,226,749.

Patented May 22, 1917.  
 3 SHEETS—SHEET 2.



*Inventor:*  
 C. Cate.  
*By* Chamberlain & Breidenreich  
*Attorneys.*



C. GATE.  
 AUTOMATIC STOPPING DEVICE FOR GRAPHOPHONES.  
 APPLICATION FILED APR. 5, 1915.

1,226,749.

Patented May 22, 1917.

3 SHEETS—SHEET 3.

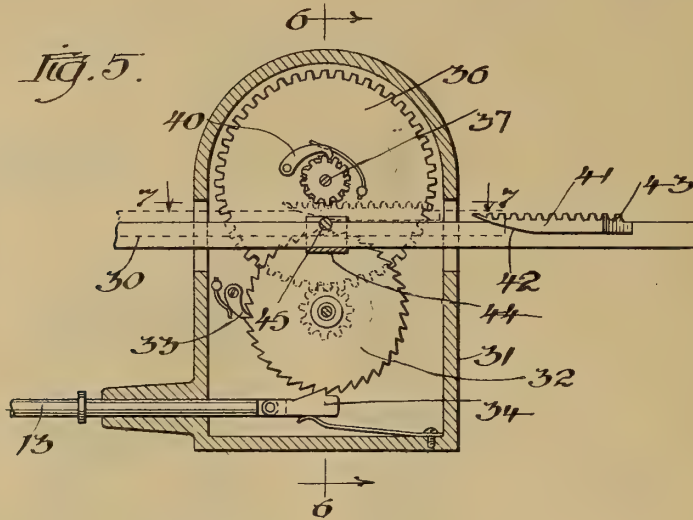


Fig. 6.

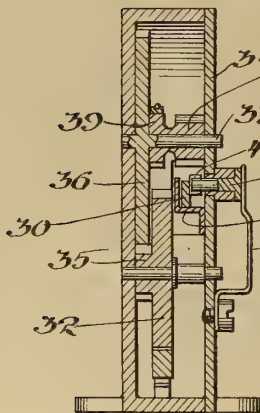
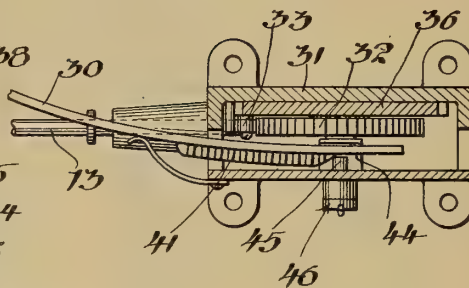


Fig. 7.



Inventor  
 C. Gate.

By Chamberlain & Freudenreich  
 Attorneys.



# UNITED STATES PATENT OFFICE.

CLARENCE CATE, OF CHICAGO, ILLINOIS, ASSIGNOR TO FRANK F. AKERLY, OF CHICAGO, ILLINOIS.

## AUTOMATIC STOPPING DEVICE FOR GRAPHOPHONES.

1,226,749.

Specification of Letters Patent.

Patented May 22, 1917.

Application filed April 5, 1915. Serial No. 19,121.

*To all whom it may concern:*

Be it known that I, CLARENCE CATE, a citizen of the United States, residing at Chicago, county of Cook, State of Illinois, have invented a certain new and useful Improvement in Automatic Stopping Devices for Graphophones, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention has for its object to produce a simple and novel attachment for graphophones whereby the record carrying member is stopped when the end of the record is reached.

A subsidiary object of my invention is to produce a device of the character described which may be easily and conveniently attached to machines already in use.

The various features of novelty whereby my invention is characterized will herein-after be pointed out with particularity in the claims; but for a full understanding of my invention and of its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawings, wherein:

Figure 1 is a top plan view of a fragment of a graphophone having my attachments thereon;

Fig. 2 is a side elevation of the parts shown in Fig. 1, portions of the casing of the machine being shown in section;

Fig. 3 is an enlarged view of one end of the driving rod with its supporting casing shown in section;

Fig. 4 is a section on an enlarged scale on line 4—4 of Fig. 2;

Fig. 5 is a vertical section through the intermittent driving mechanism between the main driving rod and the remainder of the stop mechanism;

Fig. 6 is a section on line 6—6 of Fig. 5; and

Fig. 7 is a section taken approximately on line 7—7 of Fig. 5 with the parts in the positions indicated in dotted lines in Fig. 5.

Reference being had to the drawings 1 represents a revoluble vertical shaft having near the upper end a disk-like table, 2, for supporting a record disk. 3 is a reproducer arm mounted so as to swing on vertical trunnions at its outer end, one of the trunnions being indicated at 4. The sound box, 5, is carried upon one end of a hook shaped part, 6, of the reproducer arm arranged to swing about an axis extending at right angles to the axis of the main portion of the arm and thus permitting the sound box to be swung upwardly and rearwardly and be out of the way when the record disks are changed. All of the parts heretofore described, together with the casing 7, a portion of which is illustrated, and the brake or stop handle, 8, are old and well known and are illustrated simply to represent sound reproducing machines in general.

The stop or brake handle, 8, is of the kind that tends, when properly adjusted and set, to assume its braking or stop position, a spring, 9, being provided for this purpose. In accordance with my invention I provide a holding device which is adapted to lock the brake or stop handle in its release position, this device being tripped when the end of a record is reached, and causing the machine to stop. The actual tripping of the holding or catch device is accomplished by parts movable with the reproducer arm, while the tripping devices are set in action through power derived from the motor of the machine.

In the arrangement illustrated, there is placed on the shaft 1, just below the table 2, an eccentric, 10. Upon the top wall or partition of the casing or cabinet lying just below the table 2 is a tube, 11, provided with suitable flanges, 12, which may be screwed down upon said wall or partition, the tube lying radial to the shaft 1. Extending through this tube is the main actuating rod, 13, having on its inner end a roller, 14, engaging with the eccentric. Rotary movement of the rod is prevented by a pin, 15, extending through short slots, 16, in the surrounding tube; while a spring, 17, lying within the tube about the rod tends constantly to hold the roller against the eccentric. The member 11 extends outwardly beyond the edge of the table 2 and is there provided with one or more upwardly projecting ears, 18, upon which is fulcrumed a catch lever, 19, having at one end a hook, 20, in position to engage with the brake handle, 8, when the latter is in its release position while at its other end it is provided with a broad foot, 21, underlying the outer

portion of the reproducer arm. Lying underneath the main portion of the reproducer arm and extending in the direction of the length thereof, is a trip lever, 22, hinged at one end as at 23 to a suitable clamp, 24, which may conveniently be slipped upon the transverse part, 6, of the reproducer arm. Fixed to the under side of the reproducer arm is a small hook, 25, which is adapted to underlie an intermediate portion of the lever 22 and hold it raised. On the free end of the lever 22 is a weight, 26. The parts are so proportioned that when the lever 22 is pushed off the hook 25 the weighted end drops down upon the broad foot, 21, of the catch lever so as to release the brake handle of the machine and bring the machine to rest.

The parts are so arranged that when the lever 22 is lifted in proximity to the hook it is placed under a slight lateral tension which will cause it to move laterally a sufficient distance to seat itself firmly upon the hook and be yieldingly held there against accidental displacement.

In order to reset the trip lever 22 automatically whenever a record is changed, I have provided a device for lifting the lever back upon its seat whenever the sound box is swung back. To this end I have supported on the under side of the reproducer arm, in proximity to the member 25, a lever, 27, projecting at its outer end into the path of the sound box or some adjacent member when the sound box is swung back. The inner end of the lever 27, that is the end lying beneath the trip lever 22, is provided with a broad concave seat, 28, in a position to receive and remain in engagement with the lever 22 when the latter is tripped and drops. In other words, when the parts are in the positions indicated in Fig. 2 and the trip lever is pushed from its seat on the member 25 it drops down into the seat 28, swinging the lever 27 about its pivot, the inner end of the lever dropping down and the outer end rising. When a record is to be changed and the sound box is swung back, the weight of the sound box comes upon the outer end of the lever 27 and causes this lever to swing in a direction to raise the trip lever until it is at least high enough to slip upon its supporting seat, whereupon the tension of the lever 22 comes into play and causes the lever to spring laterally upon the seat. Thus the lever 27 is released of the weight of the trip lever and the sound box may be swung into its working position without in any way affecting the trip lever.

The motive power for pushing the trip lever from its seat is supplied by the rod 13 but only at a time when the end of the record is reached. To this end I have extended the rod 13 as well as a connecting rod, 30, which is hinged at one end to the trip lever 22 into

what may be termed a selective clutching mechanism arranged within a casing, 31. The clutching mechanism is best shown in Figs. 5, 6 and 7. Within the lower portion of the casing 31 is a ratchet wheel, 32, engaged by a pawl, 33, which prevents backward movement thereof. The outer end of the rod 13 is provided with an actuating pawl, 34, which engages with the ratchet wheel and moves it step by step as the actuating rod is reciprocated. Fixed to the ratchet wheel is a pinion, 35, which meshes with a gear wheel, 36, arranged in the upper portion of the casing and fixed upon its shaft, 37. Loose on the shaft 37 is a pinion, 38, having fixed thereto a small ratchet wheel, 39, which is engaged by a pawl, 40, carried by the gear wheel 36. The result is that the pinion 38 may turn in one direction incidentally to the gear wheel 36, this being in the direction which is the forward direction, corresponding to the direction in which the gear wheel 36 is driven by the actuating rod 13 and intermediate devices. The rod 30 extends through the casing 31 just below the pinion 38 and, on the outer side thereof, at some distance from the end, is a rack bar, 41, having teeth adapted to mesh with the pinion 38. The rack bar is of less depth than the rod 30 and has its front end, 42, wedge shaped as viewed from the side and its rear end, 43, wedge shaped as viewed from the top or bottom. Within the casing below the pinion 38 is a rest, 44, on which the rod 30 is adapted to ride; this rest being far enough below the pinion 38 to permit the rack bar to move clear of the pinion while the member 30 rides on the seat. Projecting through the wall of the casing at a point between the seat 44 and the pinion 38 is a pin, 45, yieldingly pressed inwardly by a spring, 46. The parts are so proportioned that when the rod is in the position shown in full lines in Fig. 5 and is drawn toward the left, the beveled under face, 42, of the rack rides up on the pin 45 lifting the rack and the member 30 and bringing the rack into mesh with the pinion. If the member 30 is moved far enough to the left to allow the rack bar to drop down in front of the pin 45, the member 30 may be pushed back toward the right without bringing the rack into engagement with the pinion because the beveled rear end, 43, of the rack bar will push the pin 45 outwardly so as to allow the member 30 to move back while resting on the seat 44.

When the parts are assembled, as illustrated, and the machine is started, the gradual swinging of the reproducer arm carries the rod 30 slowly in the direction to withdraw it from the casing 31, while upon each revolution of the record disk, the driving rod 13 moves the gearing of the selective clutch mechanism forward a step. When the rack 41 is in engagement with the pinion



38, it will be driven by the pinion at the same speed that it is carried by the reproducer arm during the playing of the record. Furthermore, the parts are so proportioned that whenever the end of a record is reached, the rack 41 will be found meshing with the pinion 38; the rack being long enough to compensate for different lengths of records so that when the record is a short one, the teeth at the front end of the rack will engage with the pinion when the end of the record is reached, while, with a longer record, the teeth toward the rear end of the rack will be found in mesh with the pinion when the end of the record is reached. As I have heretofore said, as long as the record is being played, and the reproducer arm is swinging slowly toward the center of the disk, the engagement of the rack with the pinion produces no other result; but, when the end of the record is reached, and the needle no longer travels toward the center of the disk, the reproducer arm comes to rest and any further forward movement of the rod 30 is from the rear end through the rack and pinion and not from the other end. Consequently, the rod 30 will be driven forward by the rack and pinion and the trip lever 22 will be pushed from its seat on the member 25 and will drop down so as to disengage the catch lever and allow the brake to be applied. Thereafter when the record disk is changed, the sound box is swung back out of the way and resets the trip lever in the manner heretofore described. The reproducer arm is then swung as a whole far enough to allow the rear end of the rack bar 41 to drop down in front of the pin 45 and bring the rod 30 upon the seat or shelf 44, whereupon the reproducer arm may be swung back to bring the needle to the starting point, the rod 30 traveling back through the clutch device to the position shown in full lines in Fig. 5. Then when the new record has been placed in position and the sound box swung down, the controlling handle, 8, is shifted to its release position and is immediately caught and held by the catch lever 19; so that the machine will run until the entire record is played, whereupon it will again be stopped in the manner heretofore explained.

In order that the attachments may be placed on machines of any desired type, I prefer to make the actuating rod 13 in at least two pieces, there being a joint, 50, in the rod near the point where it emerges from the tubular supporting casing 11. This permits the attachments to be placed upon machines having a hinged top without making it necessary to dismantle the attachments when the top is swung back; all that is required being the unjointing of the actuating rod at the joint 50 before the top is swung back.

It will be seen that all of the attachments in the particular embodiment illustrated are of a kind which permits them to be applied readily to existing machines without making any changes in the machines themselves, and without requiring special tools except a screw driver for the purpose of screwing the several casings in place and attaching the parts carried by the reproducer arm to the latter.

While I have illustrated and described only a single form of my invention which has been successfully used on one type of graphophone, I do not desire to be limited to the particular structural details illustrated and described or, broadly speaking, to any particular kind of graphophone as it will be evident that various changes in details may be made to adapt the attachments to machines differing from each other in construction; and I intend to cover all forms and arrangements which come within the terms employed in the definitions of my invention constituting the appended claims.

#### I claim:

1. In a stopping mechanism for a graphophone, the combination with a traveling arm and a member movable relatively thereto, of a controller movable in unison with the said arm, an actuator for said controller, and means driven by the aforesaid member for moving said actuator during normal running of the machine at the same speed and in the same direction as the controller is carried by the said arm while the latter is advancing.

2. In a stopping mechanism for a graphophone, the combination with a traveling arm and a member movable relatively thereto, of a controlling lever mounted on and movable with the said arm, an actuator for said lever, and means driven by the aforesaid member for moving the actuator at the same speed and in the same direction as that in which the lever is being carried by the said arm while the latter is advancing.

3. In a stopping mechanism for a graphophone, the combination with a traveling arm and a member movable relatively thereto, of a device mounted on and movable with the said arm, a driving element for said device movable back and forth, means associated with the aforesaid member for actuating said driving element, and selective clutch mechanism for automatically connecting said element to the aforesaid device and moving the latter relatively to said arm.

4. In a stopping mechanism for a graphophone, the combination with a traveling arm and a member movable relatively thereto, of a device movable in unison with the said arm, a gear wheel, an actuator for said device in the form of a rack bar adapted to mesh with said gear wheel, and means associated with the aforesaid member for driv-



ing said gear wheel at such a speed as to move the rack bar forward at the same speed that the aforesaid device is carried by the said arm while the latter is advancing.

5 5. In a stopping mechanism for a graphophone, the combination with a traveling arm and a member movable relatively thereto, of a lever movable in unison with the said arm, a gear wheel, a rack bar connected at one  
10 end to said lever and adapted to mesh with said gear wheel, and means actuated by the aforesaid member for turning the gear wheel at such a rate as to move the rack forward at the same speed as that at which the  
15 lever travels while the said arm is advancing.

6. In a stopping mechanism for a graphophone, the combination with a traveling arm and a member movable relatively thereto, of an actuator mounted at one end on the said  
20 arm and having rack teeth at its other end, a gear wheel, means for supporting the gear wheel beside the actuator in position to mesh with the teeth thereon in predetermined relative positions of the parts, and means  
25 driven by the aforesaid member for rotating said gear wheel at such a speed as to cause the actuator to be moved forward at the same speed as that at which it is being carried by the said arm while the latter is advancing.  
30

7. In a stopping mechanism for a graphophone, the combination with a traveling arm and a member movable relatively thereto, of an actuator movably mounted at one end on the said arm and projecting therefrom at its  
35 opposite end, and means acting on the projecting end of said actuator and driven by the aforesaid member for moving the actuator forward at the same speed and in the same direction as that in which it is being  
40 carried by the said arm when the latter is advancing.

8. In a stopping mechanism for a graphophone, a traveling arm, an element movably  
45 mounted on the end of said arm, a member movable relatively to said arm, a controller mounted on and movable with the said arm, an actuator for said controller, means driven by the aforesaid member for moving said  
50 actuator during normal running of the machine at the same speed and in the same direction as that at which the controller is carried by the said arm while the latter is advancing, whereby the controller is adapted  
55 to be automatically operated when the said arm comes to rest while the machine is running, and means mounted on the said arm

for resetting the controller when the aforesaid element is raised.

9. In a stopping mechanism for a graphophone, the combination with a traveling arm  
60 and a member movable relatively thereto, of a device movable in unison with the said arm, a driving element for said device movable back and forth, means associated  
65 with the aforesaid member for actuating said driving element, and selective clutch mechanism for automatically connecting said element to the aforesaid device and  
70 moving the latter.

10. In a stopping mechanism for a graphophone, the combination with a traveling arm and a member movable relatively thereto, an actuator, a yieldable connection  
75 between one end of the actuator and said arm for causing the actuator to be moved by the arm, and means acting on the other end of said actuator and driven by the aforesaid member for moving the actuator forward at the same speed and in the same  
80 direction as that in which it is carried by said arm when the latter is advancing.

11. In a stopping mechanism for a graphophone, the combination with a traveling arm and a member movable relatively  
85 thereto, a device movable in unison with said arm, rack teeth on one end of said device, a gear wheel in proximity to said rack teeth, means for adjusting said device and said gear wheel transversely of the axis of the  
90 latter a sufficient distance to permit the teeth to be brought into and out of mesh with each other, and means actuated by the aforesaid member for turning the gear wheel at such a rate as to move the aforesaid device  
95 forward at the same speed as that at which it travels while said arm is advancing.

12. In a stopping mechanism for a graphophone, the combination with a traveling arm and a member movable relatively  
100 thereto, of controlling means movable in unison with said arm and including a rack bar, a gear wheel arranged adjacent to said rack bar, means actuated by the aforesaid member for turning said gear wheel, and  
105 guide devices for said rack bar constructed and arranged to cause it to mesh with the pinion when moved in one direction and permit it to move in the opposite direction while out of mesh with the pinion.  
110

In testimony whereof, I sign this specification.

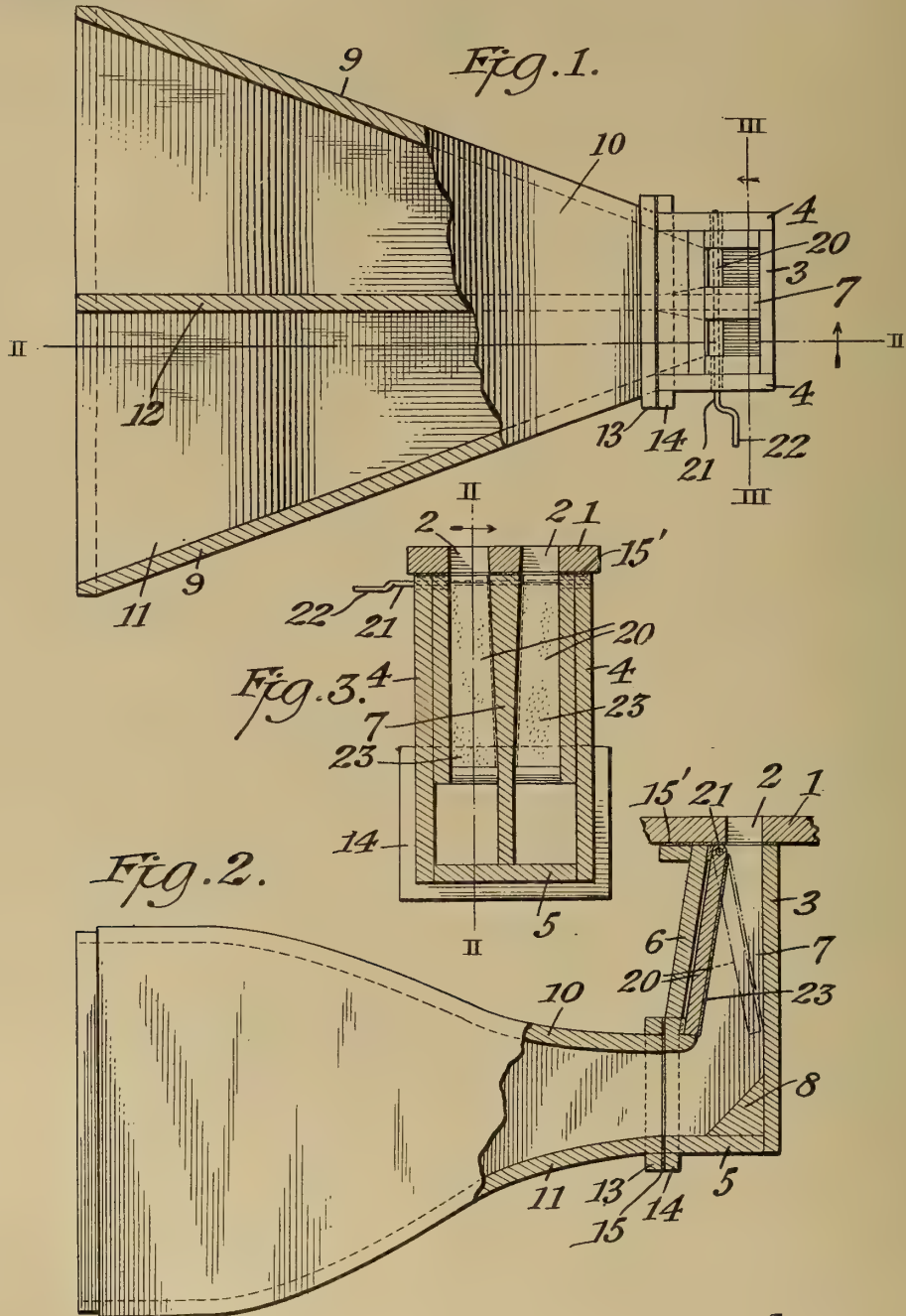
CLARENCE CATE.

1226839  
SOUND CONVEYER AND TONE MODULATOR,  
#1,226,839-----C. E. Woods,  
Patented-May 22nd, 1917.  
Filed-July 17th, 1915.

C. E. WOODS.  
SOUND CONVEYER AND TONE MODULATOR.  
APPLICATION FILED JULY 17, 1915.

1,226,839.

Patented May 22, 1917.



Inventor  
Clinton E. Woods  
By His Attorneys  
Mauro, Cameron, Lewis & Massie



# UNITED STATES PATENT OFFICE.

CLINTON E. WOODS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

SOUND-CONVEYER AND TONE-MODULATOR.

1,226,839.

Specification of Letters Patent. Patented May 22, 1917.

Application filed July 17, 1915. Serial No. 40,491.

*To all whom it may concern:*

Be it known that I, CLINTON E. WOODS, a citizen of the United States, and a resident of Bridgeport, Connecticut, (whose post-office address is Bridgeport, Connecticut), have invented a new and useful Improvement in Sound-Conveyers and Tone-Modulators, which invention is fully set forth in the following specification.

The object of the invention is to improve the quality of audible reproductions obtained from graphophones or other talking-machines; and while the invention is primarily intended for use with the so-called "concealed horn" type of machine, in which the sound-conveyer or horn is inclosed within a cabinet, yet the invention is applicable to other forms. One feature of the invention consists in the improved construction and arrangement of the sound-conveyer or horn, so as to prevent echoes or interfering sound-waves and produce only the pure tones coming from the record. Another feature of the invention consists in providing an improved tone-controller within reach of the person operating the machine. Another feature of the invention consists of the combination of the two features just named. The invention consists further in the various features of construction and arrangement hereinafter pointed out and claimed.

The several parts of the invention are capable of being embodied in various forms; but the invention will be best understood in connection with the following description, taken with the accompanying drawings, wherein is set forth its use in connection with a concealed-horn machine of the duplex or "polyphone" type, such as disclosed in the pending Woods application for U. S. Letters-Patent filed March 8th, 1915, Serial Number 12,845.

In the drawings, Figure 1 is a plan view, partly in section, of a polyphone or duplex machine, showing the arrangement of the stationary sound-passages and the tone-modulators therefor.

Fig. 2 is a vertical section, taken longitudinally through line II—II of Fig. 1; and

Fig. 3 is a vertical section taken transversely through line III—III of Fig. 1.

In these drawings, 1 represents the top shelf of the ordinary Grafonola or other concealed-horn talking-machine. In such

machines, the motor-mechanism is suspended beneath this shelf, while the turn-table is located above it; and the tone-arm, with its sound-box and stylus, is journaled upon support 1, to register with the opening 2 therein which communicates with the stationary sound-conveyer or "concealed horn". Inasmuch as the tone-arm, turn-table, motor-mechanism, etc., are of the usual construction, it is unnecessary to show them; but in the present instance, there are to be two such tone-arms, each similarly mounted above its own opening 2.

Beneath the shelf 1 is secured a sound-conveyer consisting of the vertical inner member or "throat" and the horizontal outer or flaring member or "horn". This throat is composed of the vertical rear-wall 3, the two vertical side-walls 4—4, the horizontal bottom or floor 5 which unites the lower ends of the walls 3 and 4, and the forwardly-sloping front wall 6, which extends only part of the way toward the floor 5. In the form illustrated, this throat is divided into two compartments by the wedge-shaped partition 7, which extends all the way to the floor 5. A heavy block 8, preferably of bone-dry maple, is fitted into the angle formed by the rear wall and the floor of each "throat", to present a smooth and solid reflecting-surface at an angle of substantially forty-five degrees. The horizontal "horn" is composed of the two vertical side-walls 9—9, located in divergent planes, the top wall or roof 10 which curves reversely as shown to present first its convex and then its concave portion toward the interior of the horn, and the oppositely-curved bottom-wall or floor 11. When there are two tone-arms and two compartments in the throat, then the horn also is divided into two compartments by a vertical partition 12. Around the smaller and inner end of the horn are cleats 13, and corresponding cleats 14 are provided around the adjacent opening left in the throat, for stiffening the respective members and for securing the two members together. Preferably a non-vibrating body 15 of felt or the like will be interposed between the two parts; and a similar non-vibrating body 15' will be interposed between the upper end of the throat and the shelf 1.

The oppositely-curved reverse curvings of



the roof and floor 10 and 11 serve to hold the side-walls 9 (and the partition 12, if used) under tension, and impart additional rigidity to the horn as a whole.

5 Preferably both the throat and the horn are composed of fairly thick wood, say three quarters of an inch. It will be observed that the passage of the sound-waves through the throat is rectilinear and the reflected passage  
10 from the smooth surface 8 to the exit of the horn is likewise rectilinear; and that there is a continually-expanding passageway without any ledges or pockets to cause echoes or reverberations.

15 The front wall of the throat is shown as offset somewhat from the opening 2, to provide a space for the flat valve 20, one in each throat. The valve is secured rigidly upon a rod 21, journaled in the side-walls  
20 4 and having at one end a crank 22 adapted to receive a mechanical connection which is within reach of the operator. The valve is made of wood of substantial thickness, and shaped so that its lower end may swing  
25 freely from the front of the throat to the rear; the recessed front of the throat-wall thus permits the valve, when open, to be entirely out of the way of the sound-passage. The exposed face of the valve is covered  
30 with a sheet 23 of felt or the like, adapted to make a tight joint on either edge of the valve.

In the position indicated by the full lines in Fig. 2, the valve is entirely retracted and  
35 the throat is fully open to permit the free passage of all of the sound-waves. By swinging the valve more and more toward the rear throat-wall 3, the throat is more and more restricted, and the passage of  
40 the sound-waves more and more impeded. It is to be observed, however, that even when the valve is almost in contact with the rear wall, there will be no reflection or reverberation of sound, some portion of the sound-waves  
45 passing rectilinearly downward to impinge upon the reflecting-surface 8, and the remaining portions of the sound-waves being absorbed by the felt surface 23 (instead of being reflected back against the diaphragm or otherwise interfering with the normal  
50 sound-waves). The improved tone-modulation provided by the valve (or valves, if two or more be employed) not only permits the operator to modulate the playing of a  
55 record, to suit his fancy, but likewise permits the use of the so-called hard needle as "medium" or "soft" needles, etc.,—by merely decreasing the volume of sound permitted to pass through the throat and into the horn.

60 The invention has thus been described in full detail, but only for the sake of clearness; since it is susceptible of embodiment in various forms. Certain features of the invention may be employed to the exclusion  
65 of other features thereof, and the various

parts may be transposed or modified considerably, without in any case departing from the spirit of the invention.

Having thus described the invention, what is claimed is:

70 1. In a talking-machine, a sound-conveyer having an elongated recess at one side of the passageway therethrough, a flap-valve located normally within said recess and hinged at the end nearer the origin of the  
75 sound-waves, and means within control of the operator for moving said valve to close said passageway to any desired extent, the face of said valve lying at all times at an acute angle to the outward path of said  
80 sound-waves.

2. A tone-modulator for talking-machines, consisting of the combination of a sound-passage having no opening in the side thereof, and a flat flap-valve located within said  
85 sound-passage and pivoted at its inner end so that in every position of adjustment it will lie at an acute angle to the direction of passage of the sound-waves, whereby closing of said valve prevents the passage of  
90 said sound-waves into the open air.

3. In a talking machine, the combination of a sound conduit provided with angularly-related sections, a plane reflecting surface for reflecting into a succeeding section all  
95 of the sound-waves passing through the preceding section, and an elongated valve member within the preceding section and pivoted adjacent its extremity remote from said reflecting surface, said valve member being  
100 operable to optionally vary the area of sound-wave projection on said surface.

4. In a talking machine, the combination of a sound conduit provided with angularly-related sections rectangular in cross section,  
105 a plane reflecting surface for reflecting into a succeeding section all of the sound-waves passing through the preceding section, and an elongated rectangular valve member within the preceding section and pivoted adjacent its extremity remote from said reflecting surface, said valve member being  
110 operable to entirely close said preceding section or to optionally vary the area of sound-wave projection on said surface.

5. In a talking machine, in combination with a sound conduit, an elongated valve member therein and adapted to entirely close said conduit or to optionally vary the  
120 passage of sound-waves therethrough, said valve member being pivoted adjacent its extremity nearer the source of sound-waves and being materially longer than the transverse dimension of said conduit whereby  
125 said valve member swings through a relatively small angle in passing through its maximum range of movement.

6. In a talking machine, in combination with a sound conduit, an elongated valve member therein and adapted to open wide or  
130

to entirely close said conduit or to optionally vary the passage of sound-waves there-through, said valve member being pivoted adjacent its extremity nearer the source of  
5 sound-waves and being materially longer than the transverse dimension of said conduit whereby said valve member swings through a relatively small angle in passing through its maximum range of movement,  
10 said valve member when open assuming a

position wherein the sound passage is left unrestricted.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CLINTON E. WOODS.

Witnesses:

JOHN S. GRIFFITH,  
JOHN R. PETRIE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





COMBINED PHONOGRAPH AND MOVING  
PICTURE APPARATUS,

#1,226,883-----D. Higham,  
Patented-May 22nd, 1917.  
Filed-May 17th, 1912.

D. HIGHAM.

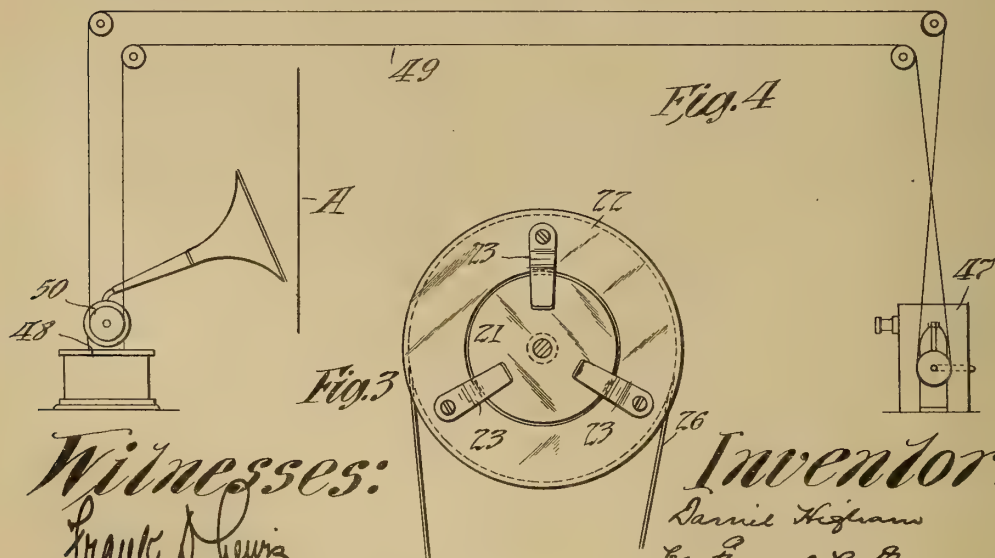
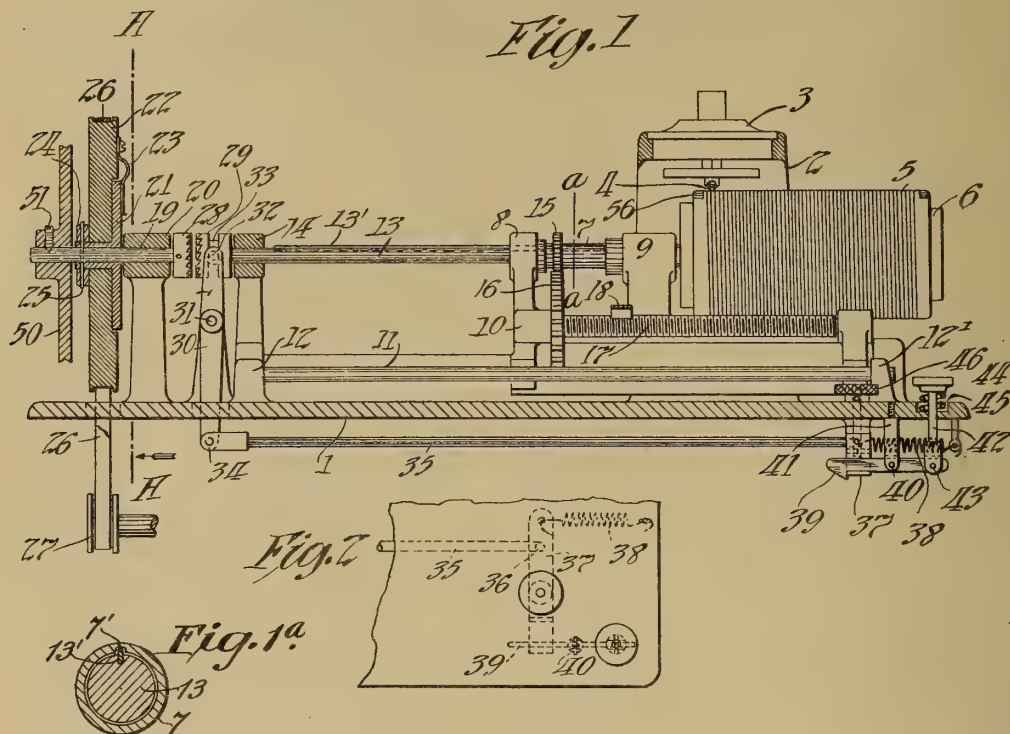
COMBINED PHONOGRAPH AND MOVING PICTURE APPARATUS.

APPLICATION FILED MAY 17, 1912.

1,226,883.

Patented May 22, 1917.

2 SHEETS—SHEET 1.



*Witnesses:*  
*Frank D. Lewis*  
*Frederick Pachmann*

*Inventor:*  
*Darius Higham*  
*by Frank E. Dyer*  
*His Atty.*



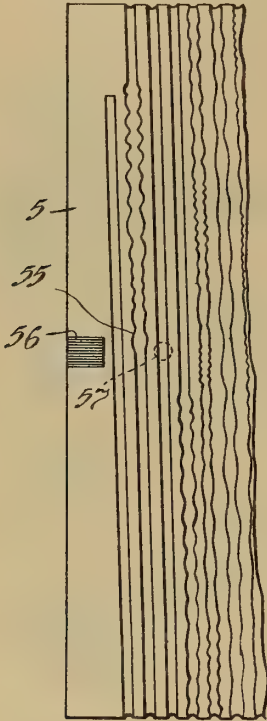


D. HIGHAM.  
 COMBINED PHONOGRAPH AND MOVING PICTURE APPARATUS.  
 APPLICATION FILED MAY 17, 1912.

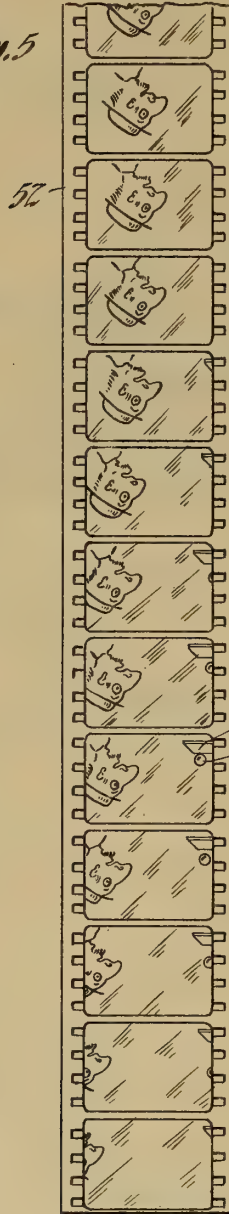
1,226,883.

Patented May 22, 1917.  
 2 SHEETS—SHEET 2.

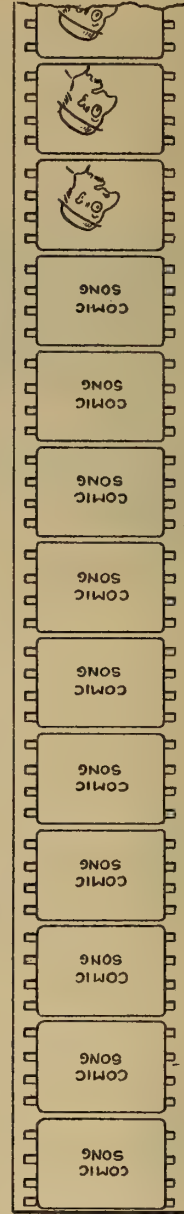
*Fig. 7*



*Fig. 5*



*Fig. 6*



*Witnesses:*  
 Frank D. Lewis  
 Frederick Packmann.

*Inventor:*  
 Daniel Higham  
 by Frank L. Lewis  
 His Atty.

# UNITED STATES PATENT OFFICE.

DANIEL HIGHAM, OF NEW YORK, N. Y.

COMBINED PHONOGRAPH AND MOVING-PICTURE APPARATUS.

1,226,883.

Specification of Letters Patent.

Patented May 22, 1917.

Application filed May 17, 1912. Serial No. 697,839.

*To all whom it may concern:*

Be it known that I, DANIEL HIGHAM, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have made a certain new and useful Invention in Combined Phonograph and Moving-Picture Apparatus, of which the following is a description.

10 This invention relates to apparatus by means of which a series of moving pictures are exhibited upon a screen or otherwise, this visual record being accompanied by the record of the sounds appropriate thereto, delivered in exact synchronism, each sound with the picture to which it belongs. The principal objects of the invention are to improve the construction of apparatus of the above named character and to provide an improved method of securing an alinement of the moving picture and sound records for synchronous operation, the improved apparatus being alone claimed in this application.

25 In accordance with my invention, the sound reproducing means is arranged to be operated at will with or independently of the motion picture apparatus, suitable means being provided for connecting said sound reproducing means for synchronous operation with the moving picture apparatus at the proper moment for securing an alinement of the moving picture and sound records. The sound record is preferably provided with a mark or index which can be readily identified with a view on the moving picture record or film so that by this means, the sound record may be set into such a position on its support that by starting the rotation or movement of the latter, as by a clutch or other starting means, when the said view is exhibited, an alinement between the two records is obtained. In practice, I have found that if the motor or other operating means for the reproducing mechanism is positively or unyieldably connected with the said mechanism, the latter starts so suddenly upon the throwing in of the clutch or starting means as to frequently cause the reproducer to jump out of the record groove or from one groove to another; so that a proper alinement of the two records is not obtained. In order to obviate this objection, I place a yielding connection between the motive means and the record

support of the sound reproducing apparatus; whereby the sound record support is caused to start into rotation gradually at the operation of the clutch or other starting means. In order to always produce an exact alinement of the sound and picture records, the time taken to throw the sound reproducing means into operation upon the appearance of the proper view must be substantially constant. Because, however, of differences in "personal equation" involving different speeds of operation for different operators, the time taken by different operators to shift the ordinary manually movable clutch for starting the rotation of the sound record support varies considerably; and this form of clutch is, therefore, not sufficiently accurate in its operation for use with devices of the class in question. In order to overcome this last named objection, I provide for the automatic operation of the clutch by means, such as a spring, which is capable of always performing the desired operation in a fixed time. A manually releasable latch may be employed to resist operation of the clutch actuating mechanism.

According to the improved process forming a part of my invention, a combined aural and visual signal is produced, as by the striking of a bell, and recorded on the original sound record and moving picture negative. After this, without stopping the sound recording apparatus and the moving picture camera, which are connected for synchronous operation, the sounds and views which are to appear on the final records are recorded. The portion of the moving picture record or film containing the view or views showing the production of the alining signal is then removed, being preferably replaced by a section of film containing a title or other inscription, the sound record being provided with a mark or index to denote the point thereof corresponding with the first view following said new section of film. A positive having been made from the moving picture negative, the sound record is set with the point corresponding to the said view under the stylus of the sound reproducing apparatus; so that when in exhibiting said positive, the above named view is exhibited by the moving picture apparatus, the phonograph may be started in exact alinement with the moving



picture apparatus. Other features of my invention will appear more fully in the following specification and appended claims.

In order that my invention may be more clearly understood, attention is hereby directed to the accompanying drawings forming a part of this specification and in which—

Figure 1 is a view, partly in front elevation, and partly in section, of apparatus embodying my improvements;

Fig. 1<sup>a</sup> is a cross section taken on line *a—**a* of Fig. 1.

Fig. 2 is a fragmentary plan view showing a detail of construction;

Fig. 3 is a view taken on line *A—A* of Fig. 1, and looking in the direction of the arrow;

Fig. 4 is a diagrammatic side view showing the moving picture and phonographic apparatus connected together for synchronous operation;

Fig. 5 is a face view of section of negative film containing views showing the striking of a bell to produce the signal through which the subsequent alinement of the moving picture and phonograph records is obtained;

Fig. 6 is a corresponding view of the positive made from the film shown in Fig. 5, and arranged for use in carrying on my improved process; and

Fig. 7 is a side elevation of a sound record designed for reproduction in accordance with my improved process.

In all of the views like parts are designated by the same reference numerals.

Referring to the drawings, the phonograph shown is of the type in which a cylindrical record carrying mandrel or support is fed axially past a stylus which is in contact with the record surface. The base plate 1 has secured to it or formed axially therewith the yoke or arch 2 by which the sound box 3 is carried. The sound box is provided with a stylus 4, which is shown in Fig. 1 as co-operating with a record 5 mounted upon the mandrel 6, the latter being secured to and carried by a sleeve 7, which is rotatably mounted in uprights 8 and 9 on the traveling carriage 10. The traveling carriage, carrying therewith mandrel 6 and sleeve 7, is adapted to travel along guide rods, one of which is shown at 11 in Fig. 1 and the other of which (not shown) is arranged in the rear of the rod 11 and parallel therewith. The rod 11 is mounted in brackets 12 and 12' rising from the base plate 1. The sleeve 7 is formed on its bore with a keyway 7' which is engaged by a key or spline 13' on the drive shaft 13 adjacent the right hand end thereof, the left hand end of the drive shaft being rotatably supported in an upright 14 on the base plate 1. In order to produce the proper feeding or movement of the carriage

10 and the record support upon the rotation of the shaft 13, the following means are provided. Sleeve 7 has secured thereto a gear 15 which operates a gear 16, the said gears being carried by the traveling carriage 10. The gear 16 is fast on the feed screw 17 which is carried by the traveling carriage 10. A nut 18 carried by the stationary frame of the phonograph engages with the feed screw 17. It will be evident that upon rotation of the shaft 13, the mandrel 6 will be rotated; and by means of the gear train including the gears 15 and 16, the feed screw 17 will be rotated and the traveling carriage with the mandrel and record thereon carried or fed past the stylus 4. So much of the construction of the phonograph as specifically described above is disclosed in my application, Serial No. 488,078 filed April 5, 1909, and does not form a part of the present invention.

My phonographic apparatus comprises the following improvements: A short shaft 19 is supported in a bearing 20 on the base plate of the phonograph and is arranged in alinement with the shaft 13. The shaft 19 carries a friction member 21 which is provided with a hub-like portion mounted on the said shaft and also with a flange extending outwardly of the latter. Upon the hub of the member 21 is rotatably mounted a drive pulley 22 which is held in frictional engagement with the flange of member 21, as by springs 23. A collar 24 is mounted on the end of the member 21 opposite that carrying the friction flange and serves to limit axial movement of the drive pulley 22, a pin or equivalent means 25 passing diametrically through the collar 24, the hub of the member 21 and the shaft 19, and thereby serving both to hold the said collar against movement on the member 21 and to secure both of these members to the shaft 19. Driving pulley 22 is driven, as by a belt 26, from a pulley 27 connected with a motor (not shown). The shaft 19 is provided at its end adjacent the shaft 13 with an enlarged toothed portion 28 so that it is adapted to be connected with or disconnected from the shaft 13 by a clutch 29 having a toothed face adapted for engagement with the toothed face of the enlargement 28. By the provision of the frictional connection between the pulley 22 and the member 21, the shaft 13, the mandrel, and the record thereon are permitted to start gradually into rotation upon the throwing in of the clutch 29 regardless of the comparatively high speed of the pulley 22, this gradual rotation being insured by the momentum of the record support and feeding mechanism as well as by the friction of the stylus 4 on the record 5. The clutch 19 may be moved into or out of clutching engagement with the enlargement 28 by means of an arm 30 pivoted at 31 and



carrying at its upper end a pin 32 which engages with the reduced portion 33 of the clutch member 29. Arm 30 has secured to the lower end thereof, as by the pivotal connection 34, a link 35 which is pivotally connected at its opposite end, as at 36, with a lever 37, the latter being pivotally supported from the base plate 1 for movement about a vertical axis. As stated above, I prefer to operate the clutch 29 automatically, as by a spring. I accordingly provide a tension spring 38 connected at its ends respectively to the base plate of the phonograph and to one end of the lever 37, as clearly shown in Fig. 2. In order to resist the operation of the clutch by the spring 38 and to cause the clutch to be held out of engagement with the member 28, I provide a latch lever 39 pivoted, as at 40 to a lug 41 projecting below the bed plate 1 and secured thereto. The lever 39, as shown in Fig. 1, is provided with a notch adapted to receive the forward end of the lever 37 and to prevent rotation of the latter by the spring 38. The latch 39 may be released from the lever 37 by depressing a member 42 projecting above the base plate 1 and pivoted, as at 43, to the end of the latch opposite that adapted for engagement with the lever 37. The numeral 44 designates a button or finger piece secured to the top of the member 42 to facilitate the manual operation thereof, and the numeral 45 designates a compression spring adapted to hold or return the member 42 to its raised position and to normally hold the latch in engagement with the lever 37. It will be seen that a very slight depression of the member 42 will cause the lever 37 to be released from the latch 39 and permit the spring 38 to cause the clutch to be thrown into engagement with the member 28. It will furthermore be seen that the time taken for throwing in the clutch is practically independent of the speed or "personal equation" of the operator. A member 46 provided with a knurled head and secured to the pivot of the member 37 permits the manual adjustment of the lever 37 into latching engagement with the member 39.

Referring to Fig. 4, the numeral 47 represents a moving picture apparatus as a whole and the numeral 48 a phonographic apparatus, the latter being arranged behind a screen A upon which the pictures from the apparatus 47 are adapted to be projected, the apparatus 47 and 48 being connected for synchronous operation. Various kinds of synchronizing apparatus such as that disclosed and claimed in my application, Serial No. 461,869, filed November 10, 1908, may be employed, the apparatus shown comprising a flexible member 49 passing over a pulley 50 secured to the shaft 19 (see Fig. 1) of the phonographic apparatus, as by a screw 51 (see Fig. 1), this member 49 being connect-

ed with the moving picture apparatus 47 to cause the operation of the latter in synchronism with the phonograph.

In accordance with my invention, a starting point for alining the picture and sound records for future use is made in the following way. After a moving picture camera and a recording phonograph have been arranged for simultaneously and synchronously taking a suitable record, such as that produced by a person singing and dancing, the apparatus is started into operation, a person comes on the stage and strikes a bell or equivalent means with a hammer or in any other suitable way makes a distinctive sound which can readily be identified with a picture or view of momentary duration, the sound and view being simultaneously recorded by the phonograph and the camera respectively. After this, without stopping the recording apparatus, the song and dance or other matter to be recorded are produced and the combined phonographic and moving picture records made. A developed moving picture film or negative made in this way is shown in Fig. 5, the fifth picture from the bottom showing a hammer 53 or other suitable striker in engagement with a bell 54. After development of the original film, the pictures showing the striking of the bell are preferably removed, being foreign to the subject matter of the remainder of the record. Preferably a new section of film containing a title or other suitable inscription is cemented or otherwise secured to the film 52 in place of the removed portion. In practice I remove about the first ten pictures on the original film, but it is obvious that the number of pictures removed depends upon the nature of the signal and the visual record made thereof. It is also obvious that the strip of film replacing the removed section need not be of exactly the same length as the latter; and in practice, the portion of the film containing the title is commonly made from fifteen to twenty feet long for ordinary moving picture film. Positives are now made from the negative by any suitable process, one of these positives being shown in Fig. 6. The title having been secured to the negative, these positives may obviously be made in one continuous strip free from joints.

The phonograph record made as described above will have a series of undulations 55 (see Fig. 7) formed by the sound emitted when the bell represented at 54 is struck by the hammer. As the length of the portion of film from the view showing the striking of the bell to the first of the original views retained in the positive is known, the length of the sound record impression from the undulations 55 to the point corresponding with the first picture following the title in the positive picture film can readily be deter-



mined. This having been determined, a mark or index 56 is placed at the periphery of the sound record to indicate the proper angular position of the sound record with respect to the reproducer stylus when the sound reproducing mechanism is arranged for reproducing the sound or sounds corresponding to the last named view. This mark is preferably arranged to be placed in alinement with the reproducer stylus in placing the reproducing mechanism is starting position. As shown in Fig. 7, the mark 56 is placed in alinement with the end of the series of undulations 55, the correct position of the reproducing stylus in this instance, for the beginning of the sound reproduction being shown in dotted lines at 57 one revolution in advance of the said undulations.

In reproducing the combined record with my improved apparatus, the clutch 29 is set to disengage the shaft 13 from the driving pulley 22. The phonograph record 5, or a duplicate made thereof by any well known process is placed upon the mandrel 6 with the reproducing stylus engaging the beginning of the record groove; and the record is then manually rotated until the sound or sounds corresponding to the original alining signal are heard. After this, the record is rotated the necessary amount for bringing the reproducer stylus to starting position, this position being accurately obtained by bringing the mark 56 into alinement with the reproducing stylus. The positive film is then exhibited, beginning with the title, by means of the moving picture projecting or exhibiting apparatus 47; and when the first picture following the title or inscription is exhibited, the operator presses the finger piece 44 to release the catch 39 and permit the spring 38 to cause the clutch 29 to be thrown in engagement with the member 28. In this way, an exact alinement of the moving picture and sound records is obtained; and by means of the synchronizing connection between the phonographic and moving picture apparatus the two records may be reproduced in synchronism.

It is obvious that various changes may be made in the details of construction of the apparatus shown, and in the exact particulars of the method described without departing from the spirit of my invention.

Having now described my invention, what I claim and desire to protect by Letters Patent of the United States is as follows:—

1. In a device of the class described, the combination of a rotatable support, driving means, power transmitting means connected with said driving means and comprising a plurality of yieldably connected members, and means for operatively connecting said power transmitting means to or for disconnecting the same from said support, substantially as described.

2. In a device of the class described, the combination of a rotatable record support, a shaft connected therewith for rotating the same, driving means, power transmitting means connected with said driving means and comprising a plurality of yieldably connected members, and means for operatively connecting said power transmitting means to or for disconnecting the same from said shaft, substantially as described.

3. In a device of the class described, the combination of a rotatable record support, a shaft connected therewith for rotating the same driving means including a pivoted member, power transmitting means connected with said driving means and comprising a plurality of yieldingly and frictionally connected members, and means for operatively connecting said power transmitting means to or for disconnecting the same from said shaft, substantially as described.

4. In a device of the class described, the combination of a rotatable record support, a shaft connected therewith for rotating the same, driving means, power transmitting means connected with said driving means and comprising a plurality of yieldably connected members, and a clutch for operatively connecting said power transmitting means to or for disconnecting the same from said shaft, substantially as described.

5. In a device of the class described, the combination of a rotatable record support, a shaft connected therewith for rotating the same, driving means, power transmitting means connected with said driving means and comprising a plurality of yieldably and frictionally connected members, and a clutch for operatively connecting said power transmitting means to or for disconnecting the same from said shaft, substantially as described.

6. In a device of the class described, the combination of a rotatable record support, a shaft connected therewith for rotating the same, driving means, power transmitting means comprising a plurality of yieldably connected members, one of which is connected with said shaft, and the other with said driving means, and a driving member connected for synchronous rotation with said shaft, substantially as described.

7. In a device of the class described, the combination of a rotatable record support, a shaft connected therewith for rotating the same, driving means, power transmitting means comprising a plurality of yieldably connected members, one of which is connected with said driving means, means for operatively connecting the other of said yieldably connected members to or for disconnecting the same from said shaft, and driving means connected for synchronous rotation with said last named member, substantially as described.



8. In a device of the class described, the combination of a rotatable record support, a shaft connected therewith for rotating the same, driving means, power transmitting means comprising a plurality of frictionally connected members, one of which is connected with said driving means, means for operatively connecting the other of said frictionally connected members to or for disconnecting the same from said shaft, and driving means connected for synchronous rotation with said last named member, substantially as described.

9. In a device of the class described, the combination with a driving member, a driven member, and means adapted to operatively connect said members, of automatic means for moving said connecting means into operative position, spring operated means for holding said moving means inoperative, means for releasing said holding means, and means for moving said automatic means into operative relation to said holding means, substantially as described.

10. In a device of the class described, the combination of a driving member, a driven member, and means adapted to operatively connect said members, of automatic means for operating said connecting means, said automatic means comprising a plurality of levers, a link connecting said levers, and a spring for moving said link and levers, means for holding said automatic means inoperative, and means for releasing said holding means, substantially as described.

11. In a device of the class described, the combination with a driving member, a driven member, and means adapted to operatively connect said members, of automatic means for moving said connecting means into operative position, means for holding said moving means inoperative, means for releasing said holding means, and

pivoted means for moving said automatic means into operative relation to said holding means, substantially as described.

12. In a device of the class described, the combination with a driving member, a driven member, and means adapted to operatively connect said members, of automatic means for moving said connecting means into operative position, spring operated means for holding said moving means inoperative, means for releasing said holding means, and pivoted means for moving said automatic means into operative relation to said holding means, substantially as described.

13. In a device of the class described, the combination with a driving member, a driven member, and means adapted to operatively connect said members, of automatic means comprising a spring pressed lever for operating said connecting means, a latch for holding said automatic means inoperative, and means for shifting said lever to move said automatic means into operative relation to said holding means, substantially as described.

14. In a device of the class described, the combination of a rotatable support, driving means, power transmitting means comprising a plurality of yieldably connected members, one of which is connected with said driving means, means for operatively connecting the other of said yieldably connected members to or for disconnecting the same from said support, and driving means connected for synchronous rotation with said last named member, substantially as described.

This specification signed and witnessed this 15th day of May 1912.

DANIEL HIGHAM.

Witnesses:

FREDERICK BACHMANN,  
ANNA R. KLEHM.

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REPEATER FOR TALKING MACHINES,  
#1,226,979-----W. L. Lightfoot,  
Patented-May 22nd, 1917.  
Filed-April 15th, 1916.



Patented May 22, 1917.

# UNITED STATES PATENT OFFICE.

WALLACE LUCIUS LIGHTFOOT, OF BROOKLYN, NEW YORK.

## REPEATER FOR TALKING-MACHINES.

1,226,979.

Specification of Letters Patent. Patented May 22, 1917.

Application filed April 15, 1916. Serial No. 91,322.

*To all whom it may concern:*

Be it known that I, WALLACE LUCIUS LIGHTFOOT, a citizen of the United States, and a resident of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Repeater for Talking-Machines, of which the following is a full, clear, and exact description.

10 My invention relates to means for automatically repeating a sound record on a talking machine. An object of the invention is to provide a simple, inexpensive, and efficient contrivance which can be attached to  
15 a Victor talking machine without any change or displacement of any part of the machine. A further object of the invention is to provide a device of the class described which can be easily and quickly  
20 put into operative or into inoperative position, and which, when secured to the talking machine, in no way interferes with the ordinary playing of records.

With the above and other objects in view,  
25 the nature of which will more fully appear as the description proceeds, the invention consists in the novel construction, combination and arrangement of parts as herein fully described, illustrated and claimed.  
30 In the accompanying drawings, forming part of the application, similar characters of reference indicate corresponding parts in both views.

Figure 1 is a plan view of a talking machine provided with an embodiment of my invention;

Fig. 2 is an elevation of my repeating mechanism showing the same in operative position at the moment when the sound box  
40 is shifted from the central part of the record to the margin thereof to repeat the record; and

Fig. 3 is a diagram showing the reaction of force of gravity acting on the recorder  
45 with the goose neck, which causes the sound arm to swing across the record.

Referring to the drawings, 3 is a bracket secured to the top 4 of a talking machine, preferably by the same screw which secures  
50 the top. The bracket has a lateral extension 5 disposed parallel with the top. An arm 6 is pivoted at one end thereof to said extension 5 to swing in a plane parallel to the top. To the other end of the arm 6 is hinged  
55 an arm extension 7 free to swing to and from a record 10, the swinging toward the record

being limited by the lips 8 provided at the hinge of the arm 6, whereby the downwardly extending portion 9 of the arm extension 7 is maintained clear of the record 10 which is  
60 to be repeated.

The downward extension 9 has an end groove 11 which is to engage a cam 12 mounted on the record and secured to the driving shaft 13 of the machine by any  
65 suitable means. The lower edge of the cam may have a felt base to obtain better friction between the record and the cam, whereby the rotation of the cam with the record is insured. As the reproducer 16 approaches  
70 the center, the sound arm 15 engages the rising portion 14 and swings the articulated arm in a plane parallel to the record until the groove 11 of the downward extension or rider 9 is in the path of the cam 12, as  
75 shown in dotted lines in Fig. 1. The cam engaging the groove causes the arm extension 7 of the articulated arm to move on its hinge and rise, causing the goose neck 17  
80 to turn in the union 18.

The edge of the arm extension 7 between the rider 9 and the rising portion 14 is very narrow and highly polished, so as to offer little resistance. Due to the inclination of  
85 said edge, when the articulated arm engages the cam it forms an inclined plane for the goose neck and causes the arm 15 to swing on its pivot toward the margin of the record. The movement of the arm is limited by a buffer 19 which is adapted to  
90 come in contact with the union 18 of the sound arm. The buffer 19 consists of a yielding plunger carried by an arm 20 secured to the bracket 3, preferably so that the same may be swung into operative or into  
95 inoperative position.

When the rider 9 leaves the cam 12 the sound box 16 is restored to its normal position; and to bring the articulated arm to its normal position, a resilient member 21  
100 is provided, one end of which is secured to the arm 6 and the other to the bracket 3. The displacement of the arm 6 under the action of the spring 21 is limited by a stop 22 provided on the bracket 3. The length  
105 of the cam 12 is such that the rising and shifting of the needle on the reproducer takes place within one-third of a revolution of the record. It will be noted that when the rider 9 leaves the cam there is  
110 little weight upon the arm extension 7, and, consequently, there is no undue strain on



any part of the mechanism. In Fig. 2 the dotted lines show the movement of the goose neck after it has been raised to the starting point.

5 The raising of the gravitationally operable recorder 16 by the arm extension 7 decomposes the force of gravity  $W$  into two components,— $Q$  acting at right angles to the inclined plane formed by the arm extension 7, and  $P$  acting parallel to the plane. 10 The component  $P$  is the force which acts on the sound arm 15 and causes the same to swing across the record, bringing the goose neck close to the arm 6; but the recorder is still maintained above the record 15 until the rider of the arm extension leaves the cam, when the recorder is allowed to engage the disk.

If the repeating mechanism is not to be 20 used, the cam 12 is removed from the shaft 13 and the arm extension 7 is folded over the arm 6. The buffer can also be shifted to the inoperative position.

While I have described the principle of 25 operation, together with the device which I now consider to be the best embodiment thereof, I desire to have it understood that the device shown is merely illustrative and that such changes may be made as are with- 30 in the scope of the appended claims.

I claim:

1. The combination with a talking machine having a revoluble record, a swinging sound arm movable in a plane parallel with 35 the record, a goose neck swinging in the arm to and from the record, a reproducer carried by the goose neck to engage the record,—of a repeating device comprising an arm mounted to swing in a plane parallel 40 to the record, an arm extension adapted to be disposed below the goose neck and hinged to the arm to swing to and from the record, a rider carried by the arm, a cam near the central part of the record mounted to rotate with the record and adapted to engage 45 the rider, said arm extension and arm having means limiting the swinging movement of the arm extension toward the record, an upward extension from said arm extension 50 adapted to be engaged by the sound arm when the sound arm moves toward the center of the record, whereby the rider is brought into the path of the cam, the engagement of the cam with the rider raising 55 the arm extension on its hinge from the record, whereby the goose neck is swung from the record, the inclination of said arm extension causing the sound arm to swing toward the margin of the record, whereby 60 the goose neck is allowed to swing toward the record, bringing the reproducer into engagement therewith at the margin, means for stopping the sound arm at the margin, and means for restoring the arm of the re- 65 peating device to its normal position.

2. The combination with a talking machine having a revoluble record, a sound arm mounted to swing in a plane parallel with the record, a gravitationally operable goose neck associated with the sound arm, 70 a reproducer carried by the goose neck to engage the record,—of a repeater mechanism comprising a bracket, an arm pivotally mounted on said bracket to swing in a plane parallel with the record, a gravita- 75 tionally-operable arm extension carried by said arm and adapted to be disposed below the goose neck, a rider extending from said arm extension, a cam mounted to participate in the movement of the record and 80 adapted to engage the rider, said arm extension having means adapted to be engaged by the sound arm when said sound arm is moved toward the center of the record, whereby the rider is brought into the 85 path of the cam, the engagement of the cam with the rider inclining the arm extension toward the margin of the record, whereby the goose neck is caused to swing from the record thereby disengaging the reproducer 90 from the record, the inclination of the arm extension causing the sound arm to swing to the margin, a buffer for engaging the arm at the margin, whereby said arm is 95 stopped at a predetermined position to bring the record carried by the goose neck into engagement with the record at a predetermined place, and resilient means for restoring the arm of the repeating device to its normal position. 100

3. In combination with a talking machine having a revoluble disk record, a sound arm movable across the record, and a gravitationally-operable reproducer carried by the sound arm,—a cam detachably 105 associated with the record and adapted to participate in the rotary movement of the record, an articulated arm mounted to swing across the record and having the articulated portion disposed under the reproducer, 110 means on said arm lying in the path of travel of the sound arm whereby said articulated arm is moved into the path of the cam, said cam adapted to raise the articulated portion of the arm whereby the repro- 115 ducer is raised from the disk, the raised articulated portion of the arm being adapted to present an inclined plane which causes the force of gravity acting upon the reproducer to swing the sound arm to the 120 margin of the disk, and a buffer for stopping the sound arm at a predetermined position.

4. An attachment for talking machines comprising a cam, including means for detachably securing it to a record to partici- 125 pate in the movement thereof, an arm, including means whereby the same may be mounted to swing across the sound record, a gravitationally-operable arm extension 130



hinged to the arm, means associated with the extension adapted to lie in the path of travel of the sound arm of the machine whereby the arm is moved from its normal position across the record to bring the arm extension in the path of the cam, the engagement of the cam with the arm extension raising the extension to form an incline toward the arm, resilient means for restoring said arm to its normal position, and a buffer for engaging the sound arm at the starting point of the record.

5. In combination with a talking machine having a revoluble record, a sound arm movable across the record, and a gravitationally-operable reproducer carried by the sound arm,—a cam operable by the record, an arm mounted to swing in a plane parallel to the record and articulate in a plane at right angles thereto, said arm having means lying in the path of travel of the sound arm for bringing said articulated arm into the path of the cam, whereby said arm is articulated to engage the reproducer to raise the same from the record and cause said sound arm to move toward the margin of the record.

6. In combination with a talking machine having a revoluble record, a sound arm movable across the record and a gravitationally-operable reproducer carried by the sound arm,—means adapted to move across the record disposed below the sound arm, means operable by the record, said means movable across the record adapted to lie in the path of the sound arm whereby said

means movable across the record are brought into the path of the means operable by the record, the engagement between said means bringing said means movable across the record into engagement with the reproducer for raising the same from the record and decomposing the force of gravity acting upon the reproducer so that a component force thereof acts upon the sound arm to move the same to the starting point of the record.

7. In combination with a talking machine having a revoluble record, a sound arm movable across the record and a gravitationally-operable reproducer carried by the sound arm,—means movable with the record, and means movable across the record and spaced from the sound arm adapted to be brought by the sound arm into the path of travel of said means movable with the record, said means movable across the record having an articulated portion adapted to be raised by said means moving with the record to raise the reproducer from the record and decompose the force of gravity acting on the reproducer to create a component force acting upon the sound arm to move the same to the starting point of the record.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WALLACE LUCIUS LIGHTFOOT,

Witnesses:

DONALD L. L. PRATT,  
WALTER F. FARMER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



1,227,023

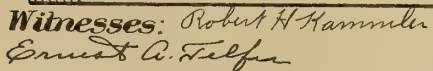
PHONOGRAPH,

#1,227,023-----G. H. Underhill,  
Patented-May 22nd, 1917.  
Filed-November 14th, 1910.



1,227,023.

3 SHEETS—SHEET 1.



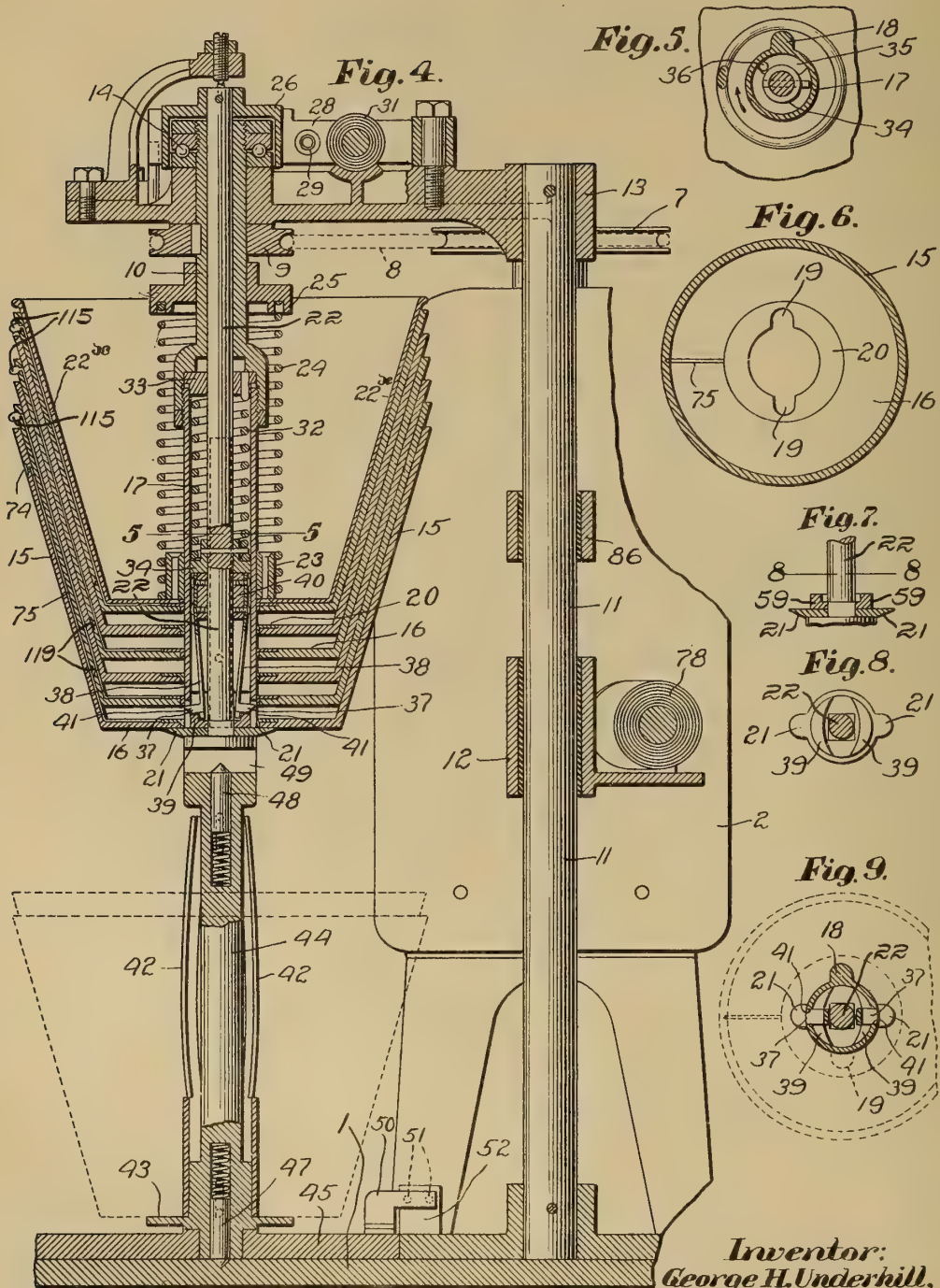
by Mary Booth Jimmy Harvey  
Att'y.



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 PHONOGRAPH.  
 APPLICATION FILED NOV. 14, 1910.

1,227,023.

Patented May 22, 1917.  
 3 SHEETS—SHEET 2.



Witnesses Robert H. Hammler  
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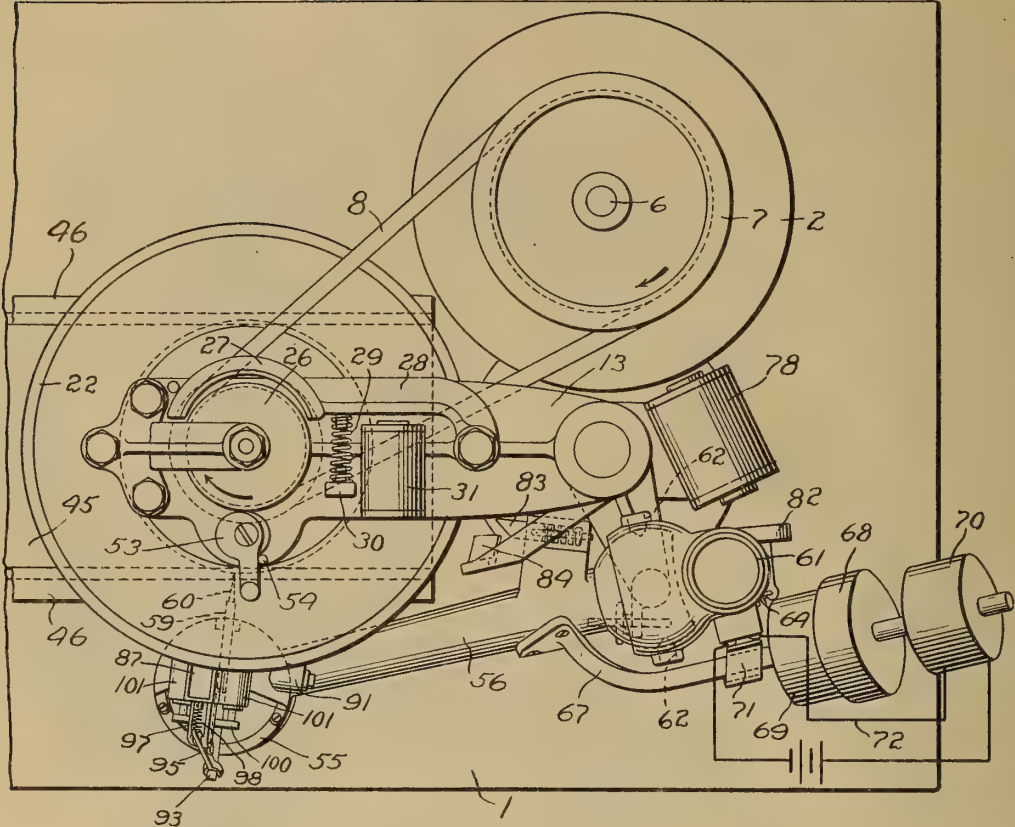


G. H. UNDERHILL.  
 PHONOGRAPH.  
 APPLICATION FILED NOV. 14, 1910.

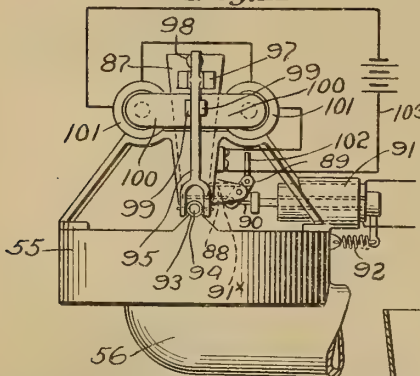
1,227,023.

Patented May 22, 1917.  
 3 SHEETS—SHEET 3.

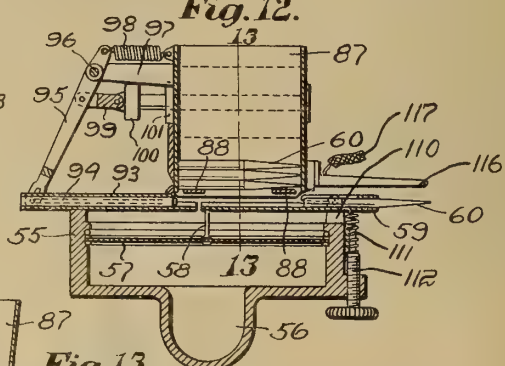
**Fig. 10.**



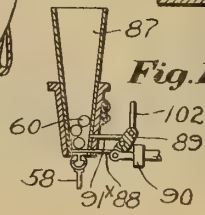
**Fig. 11.**



**Fig. 12.**



**Fig. 13.**



**Witnesses:**  
 Ernest A. Telfer  
 Robert H. Hammel

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 George H. Underhill,  
 by Mary South Jimmy Warner  
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# UNITED STATES PATENT OFFICE.

GEORGE H. UNDERHILL, OF BOSTON, MASSACHUSETTS.

## PHONOGRAPH.

1,227,023.

Specification of Letters Patent.

Patented May 22, 1917.

Application filed November 14, 1910. Serial No. 592,179.

*To all whom it may concern:*

Be it known that I, GEORGE H. UNDERHILL, a citizen of the United States, and a resident of Boston, county of Suffolk, State of Massachusetts, (whose post-office address is 86 Gainsboro street, Boston, Massachusetts,) have invented an Improvement in Phonographs, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to phonographs and more particularly though not exclusively to multiple record phonographs or those employed for playing a plurality of records.

The invention will be best understood by reference to the following description when taken in connection with the accompanying illustration of one specific embodiment thereof, while its scope will be more particularly pointed out in the appended claims.

In the drawings:

Figure 1 is a side elevation of a sound reproducing machine embodying one form of my invention;

Fig. 2 is a detail of the clutch connection between the upper and lower parts of the rotatable record support;

Fig. 3 is a sectional elevation on the line 3—3 in Fig. 1 showing the reproducer guiding cam;

Fig. 4 is a sectional elevation of the machine shown in Fig. 1 on a plane taken through the rotatable record support;

Fig. 5 is a section in plan on the line 5—5 in Fig. 4;

Fig. 6 is a section in plan taken through one of the record shells;

Fig. 7 is an elevation of the lower end of the releasing key in partial section;

Fig. 8 is a section in plan on the line 8—8 in Fig. 7;

Fig. 9 is a section in plan taken through the record driving-sleeve and releasing shaft, a record being shown in relation thereto in dotted lines;

Fig. 10 is a plan view of the machine shown in Fig. 1;

Fig. 11 is a side elevation of the reproducing mechanism showing the needle changing devices;

Fig. 12 is a section through the reproducing mechanism taken at right angles to the plane of Fig. 11; and

Fig. 13 is a section through the needle hopper taken on the line 13—13 in Fig. 12.

Referring to the drawings and to the embodiment of the invention therein specifically disclosed, I have there shown a multiple record phonograph adapted to reproduce in succession a plurality of records. While the record herein disclosed possesses certain advantages over records of the disk or cylinder type, the invention as to many of its novel features is applicable to disk or cylinder records or both, and the term phonograph is employed in its generic sense to apply to all forms of sound reproducing or sound recording machines.

Referring to the drawings, there is shown mounted upon a base 1 a driving motor 2, which may be of any suitable form or construction, but herein is an electric motor connected through the supply circuit 3 (see the diagram in Fig. 1) to a suitable source of electro-motive force 4 and controlled by the starting switch 5.

The motor shaft 6 carries near its upper end (Figs. 1 and 10) a grooved pulley 7 connected through the belt 8 with a second grooved pulley 9, the latter keyed (Fig. 4) to the upper section 10 of the record driving sleeve to be more fully referred to.

At the side of the motor on the base 1 there is also provided the upright supporting rod 11 to which is attached the bracket 12 carrying the sound reproducing devices and near its upper end also the bracket 13 which overhangs the record support and carries ball bearings 14 for the upper end of the record driving sleeve 10. The bracket 13 also sustains devices to be hereinafter described, which are provided for controlling the successive presentation of the records to the sound reproducing mechanism.

Referring now more particularly to the records and the record support, the former consist each of a shell having tapered sides 15 and provided with a perforated head 16 at the lower or smaller end, so that the record has the shape of a truncated cone with a sound groove surface lying oblique to the axis of the record. This form of record is of great advantage in a multiple record phonograph since it permits the records to be stacked one above the other in nested relation so that they can be stored compactly into a very small compass while each individual record presents a sound recording surface of unusually large effective area.

The nested records, as shown in Fig. 4, are carried upon the lower record driving



sleeve section 17, the latter having a fixed threaded attachment to the upper sleeve section 10 and being provided (see Figs. 5 and 9 and dotted lines Fig. 4) with a spline or key 18 which fits one of two diametrically opposite notches 19 formed in the perforated plate 20 with which each record head 16 is provided. When the records are in the position shown in Fig. 4, the grooves 19 register with and receive the spline 18 so that they are kept in alinement and all turned as a unit with the driving sleeve.

The lowermost record rests against a pair of diametrically opposite retaining fingers or lugs 21 carried by the lower end of the releasing shaft 22 which passes coaxially through the driving sleeve 17, the said lugs being normally disposed at right angles to the series of notches 19 in the records. The uppermost record is engaged and constantly pressed down by means of the follower 22\*, the latter comprising a conical shell adapted to fit within a record and secured to the sliding collar 23 on the sleeve 17. The follower is constantly pressed downward by means of the coiled spring 24, the upper end of which abuts against the plate 25 carried by the driving sleeve 10.

After the reproducing mechanism has been traversed across the face of the lower or exposed record, the reproducer arm is swung to one side and the lowermost record shifted, this being accomplished herein by dropping the same to the dotted line position shown in Fig. 4 to present the next successive record to the reproducing devices. The lowermost record is released by causing the retaining lugs 21 to make a quarter turn relatively to the record so as to bring them into registration with the grooves 19, whereupon the record is free to pass over the lugs and is caused to drop by gravity into the dotted line position shown.

To impart a releasing movement to the lugs, the releasing shaft 22 has secured to its upper end a brake wheel 26 adapted to be momentarily engaged by the brake shoe 27, which latter is carried by the pivoted arm 28. The shoe is normally prevented from contacting with the brake wheel by means of the spring 29 (Fig. 10) interposed between the lever 28 and fixed abutment 30, but may be drawn thereagainst, temporarily to retard the movement of the releasing shaft 22, by means of the electro-magnet 31 operatively disposed with reference to the lever 28.

To cause the releasing key normally to turn with the record driving sleeve and in fixed relation thereto, there is employed a coiled spring 32 located within the sleeve 17, one end of which spring is fastened to a collar 33 secured to such sleeve and the opposite end to the collar 34 fixed to the releasing shaft 22. This spring tends constantly to turn the releasing shaft and releasing key

relatively to the sleeve 17 so that one end of a slot 35 formed in the collar 34 (see Fig. 5) is drawn against an upright pin 36, the latter fixed on a part rotating with the sleeve 17 and serving as a stop normally to position the lugs 21 at right angles to the spline 18.

If, however, the magnet 31 is energized the brake shoe is applied to the brake wheel 26 and rotation of the releasing key momentarily checked. The rotation of the sleeve continuing, this causes the spring to yield and the pin 36 to abut against the opposite end of the slot 35, bringing the lugs 21 in line with the spline 18 and the notches 19 and releasing the lowermost record which immediately drops. The brake shoe is applied for an instant only, so that as soon as the record slips over the lugs the latter are immediately thrown back to their initial position at right angles to the spline where they serve to catch and sustain the next succeeding record until that in turn has been played, the remaining records of the series moving up thereagainst under the action of the spring-pressed follower.

In order to hold back the second record of the series while releasing the first, a pair of catches 37 are provided which are carried by spring arms 38. The latter are given such resiliency as tends to press them radially outward, but they are normally drawn inward as shown in Fig. 4 by engagement between the lower ends of the catches and the raised portions of the cam member 39 carried by the releasing shaft which bears the releasing fingers 21. The spring arms 38 are secured to a collar 40 which turns with the record rotating sleeve 17. When the movement of the releasing shaft is checked as described, the cam shaped member 39, in turning with the releasing shaft to release the lowermost record, releases the catches 37 which then move outwardly through perforations 41 in the sleeve 17, under the second record of the series and prevent the latter from moving down against the fingers 21. When the brake 27 is withdrawn from the brake wheel 26, however, the spring 32 throws the fingers 21 back a quarter of a turn and the cam member 39 in turning with the fingers draws the catches 37 into the perforations 41 of the sleeve.

The records when dropped are caused to pass over spring fingers 42 or other means serving to cushion their descent, being supported, when they have descended into the lowermost position, on the plate 43 carried by the upright supporting member 44. While the latter, if desired, may be fixed and non-rotatable, herein it forms a part of the same rotary record support with the record rotating sleeve 17 so that the records which have been reproduced, as well as those which have not been reproduced,



are all rotated together. This maintains the mass of the rotating parts at all times substantially constant irrespective of the progressive presentation of successive records to the reproducing mechanism, and, therefore, keeps a substantially constant load upon the motor.

In order that the entire lot of records when deposited in their ineffective position may be withdrawn for the purpose of substitution or for other reasons, the supporting member 44 is mounted upon the sliding plate 45 which can be slid into or out of position upon the base 1, being guided accurately into its required position by means of the guiding members 46. A spring-pressed pin 47 carried in the lower end of the support 44 positions the slide in the required location upon the base, but yields to permit the withdrawal of the slide when removal of the latter is desired. The upper end of the support is provided with a similar pin 48 which engages with a depression in the slip joint connection 49, (Figs. 2 and 4) which latter is secured to the lower end of the releasing shaft 22 and serves to turn the support 44 with the releasing shaft, but permits the ready separation of the two when the slide 45 is withdrawn.

In order that the motor may be rendered inoperative when the holder slide 45 is out of position, a cut-out switch is employed comprising a movable contact 50 carried by the slide 45 which contact, when the slide is in position, completes the motor circuit 3 by bridging a pair of contacts 51 carried by the lug 52 on the base 1. When the slide is withdrawn, however, the circuit is interrupted at the contacts 51.

In order manually to separate and shift the records from the playing position to the ineffective position, or vice versa, when the machine is not running, I have provided means for holding the record releasing shaft so that by first turning the record sleeve 10—17 backward and forward the records may be dropped one by one from the playing position to the removable support.

On the other hand by turning the sleeve 10—17 through ninety degrees the entire lot of records carried by the lower removable support may be lifted and slipped over the releasing fingers and on the sleeve the resilient catches 38 snapping back to permit each record to pass over.

For the purpose of holding the releasing shaft, I employ the cam member 53 pivoted upon the arm 13 and adapted to be turned so as to bear forcibly against the side of the brake wheel 26 and hold the same against turning. Normally the cam is turned back against the stop pin 54 in which position it leaves the brake wheel free for turning.

It is obvious that the number of records employed and the particular shape of the

records utilized may be varied within wide limits, the machine, in fact, without substantial alteration as to the feeding and presenting devices, being applicable to records of disk form.

Referring now to the sound reproducing devices, the sound box 55 is carried at the end of a hollow reproducer arm 56, being provided with the diaphragm 57 which has suitable connection 58 to the stylus carrying sleeve 59 in which is maintained the stylus needle 60.

The stylus carrying sleeve is pivoted between lugs 110 and abuts against a spring 111 which serves to maintain a given tension upon the stylus and the diaphragm. An adjusting screw 112 is preferably provided which permits this tension to be adjusted at will.

The reproducer arm 56 has a ball and socket connection with the lower end of the sound tube 61, being pivoted at 62 on said sound tube so as to be capable of a vertical movement thereon. The sound tube in turn is pivoted at 63 upon the bracket 12 so as to turn about a vertical axis, this permitting the required movement of the reproducing device toward and from the face of the records. The sound tube in turn may be employed in connection with a usual horn of any suitable construction.

The sound tube and reproducer arm are normally swung inwardly about the pivot 63 so as to cause the stylus to engage with the record groove by means of the tension spring 64, one end of which is secured to the adjusting screw 65 fastened to the bracket 12, the opposite end to a lug 66 secured to the sound tube. The reproducer arm has secured thereto the rearward extension 67 which serves as a support for the sliding counterweight 68, the latter being drawn into either one of two positions by the respective electromagnets 69 and 70.

When the sound box is at its lowermost position the magnet 70 is caused to be energized by means of a bridging contact 71 which completes an energizing circuit 72 for the magnet, this resulting in attracting the counterweight 68 and causing it to move over against the magnet 70 where it is retained by the spring-holding clip 73. In this position of the counterweight the weight of the reproducer arm and sound box is slightly overbalanced so that the stylus is then free to travel up along the face of the record as it is permitted by the rotation of the record and its tracking in the record groove.

The machine, as so far described, may be employed to play a series of like records in succession, wherein the sound groove commences near the bottom of each record and terminates near the top thereof, or it may



be employed to play a series of records wherein successive records alternate, the one having its sound groove commencing near the bottom and terminating near the top and the next successive record having its groove commencing near the top and terminating near the bottom. The latter form of record is particularly advantageous where it is desired to play continuous music or where continuity of reproduction for other reasons should not be interrupted. With the second form of record described, the stylus can pass from the end of the sound groove at the top of one record to the beginning of the sound groove near the top of the next adjacent record with no substantial intermission.

For the purpose of illustration both types of records are herein shown, the outer or lowermost record of the series shown in Fig. 4 being constructed to be played according to the first mode of operation referred to, and the remaining members of the series being constructed to be played according to the second mode of operation referred to.

Referring first to the playing of the type first referred to, the mode of operation is as follows:

The upward travel of the stylus continues until the record has been completely reproduced whereupon devices are set into operation which withdraw the stylus from the record and cause the arm to descend to its initial position at the same time applying the brake shoe 27 to release the lowermost record as heretofore described. Any suitable controlling mechanism may be utilized for this purpose but herein such control is effected electrically by means of electrical contacts in the surface presented by the record itself.

Referring to Fig. 6 and the lowermost record in Fig. 4, it will be seen that the face of each record is provided near its upper end with a contact piece 74 which is located at the end of the record groove. Such contact member is connected to the conductor 75 with the plate 20 and thereby grounded upon the frame of the machine. When the stylus reaches the end of the record groove it touches the contact 74 and a circuit is thereby completed through the frame of the machine, the stylus, the reproducer arm 56, the battery 76 (one terminal of which is connected to the reproducer arm) (see Fig. 1) the conductor 77, the magnet 78, the conductor 79, the counterweight magnet 69, the conductor 80, the magnet 31, the conductor 81, and thence again to the frame of the machine. The bracket 12 which supports the reproducer arm herein is insulated from its support 11 (see Fig. 4) and therefore from the machine frame.

When, therefore, the stylus reaches the end of the record groove, it touches the contact 74 and simultaneously energizes the brake magnet 31, the counterweight magnet 67 and the magnet 78. The energization of the brake magnet 31 drops the lowermost record as previously described, while the energization of the counterweight magnet 69 shifts the counterweight back to the position shown in Fig. 1 where it causes the descent of the reproducer arm and its restoration to its initial position. The magnet 78 which is carried upon the bracket 12 attracts an armature 82 (Fig. 10) carried by the lug 66 on the sound tube and swings the latter with the reproducer arm so as to withdraw the stylus away from the record and out of its path when the latter descends. The energization of these magnets is only momentary, but meanwhile a spring-pressed pin 83 which is carried by the reproducer arm (see Fig. 10) is caused to snap laterally past a depending cam 84. This pin bearing against the cam during the descent of the reproducer arm, prevents the latter from swinging the stylus back into contact with the next adjacent record until the arm has fully descended, whereupon the pin 83 drops over the lower end of the cam and allows the spring 64 to draw the stylus into contact with the record at the initial or starting point of the sound groove. When this point is reached the bridging contact 71 completes the energizing circuit 72 for the counterweight magnet 70, the counterweight is shifted and the reproducing mechanism is ready to reproduce the next record. The cam 84 which is carried by the insulated bracket 86 is of suitable shape to cause the reproducer arm to execute an inward movement simultaneously with its descent.

Preferably and herein I have provided means whereby simultaneously with the reproduction of a given record and the restoration of the reproducer to its initial position a fresh stylus or reproducing needle is substituted for the one previously used. Referring to Figs. 11, 12 and 13, on the sound box there is provided a hopper 87 adapted to carry a supply of reproducing needles 60. The lower end of the hopper is large enough to permit the needle to pass through the same into the semi-cylindrical end of the needle-receiving sleeve 59, but its exit is normally prevented by means of the pair of fingers 88 which constitute a gate. The fingers 88 are connected to the pivoted block 89, the latter in turn being jointed to the end of the plunger rod 90 of the solenoid magnet 91, the arrangement being such that when the magnet is energized the fingers 88 are withdrawn permitting the lowermost needle to descend into the needle carrier 59, the exit



of the superposed needles being prevented by the simultaneous introduction of other fingers 91\* jointed to the upper end of the block 89. A spring 92 secured to the depending lug on the opposite end of the plunger 90 maintains the gate 88 normally in a closed position.

To expel the old needle and introduce the new, there is provided in alinement with the sleeve 59 a second sleeve 93 in which is slidably movable the pin 94, the latter secured to the lever 95 by means of a pin passing through a slot in the sleeve 93. The lever 95 is fulcrumed at 96 upon a fixed lug 97, being normally secured in the position shown in Fig. 12 by use of the spring 98. It is also connected, however, by the link 99 to the armature 100 belonging to the pair of electro-magnets 101, so that, when the latter are energized, the lever is moved and the pin 94 thrown forward against the deposited needle. To move the pin at the appropriate time so that the new needle will be forced into the sleeve 59 and drive the old needle out, the magnets 101 are energized by means of a bridging contact 102 which latter is carried (Fig. 13) by the pivoted block 89 so arranged that when the gate 88 is opened the contact 102 closes the energizing circuit 103 for the electro-magnets 101.

In order to energize the needle controlling magnet 91 at the appropriate time, the latter has its terminals connected (see Fig. 1), one through the conductor 104 to the battery 76 and the other through the wire 105 to a contact 106 located on the face of the cam 84 so that when the pin 83 (which is electrically connected to the reproducer arm) passes over the contact, the energizing circuit is completed and a fresh recording needle automatically substituted.

If it is desired to play two successive records without intermission by causing the stylus to pass from the end of the sound groove at the top of one record to the beginning of the sound groove at the top of the other and from the end of the sound groove near the bottom of the latter to the beginning of the sound groove near the bottom of the next adjacent record, the following means are provided for this mode of operation of the machine:

In such case the contact 74 is omitted from the first record and the sound groove extended to the very uppermost edge of the record. When the stylus reaches the end of the sound groove a contact is made so that the first or lowermost record is dropped and the stylus slipping over the edge of the dropped record immediately engages with the next record and enters its sound groove near the initial end thereof, the playing proceeding without intermission.

To complete the contact the succeeding

record (see the second record in the series of Fig. 4) is provided with a contact 115 near its upper end and projecting slightly from the surface of the record so that it will be touched by a contact finger 116 (Fig. 12) when the stylus reaches the end of the sound groove at the edge of the preceding record. This finger projects from the sound box parallel with and slightly above the stylus and while insulated from the sound box is connected to the conductor 117, the latter (see Fig. 1) passing to the battery or other source of electromotive force 118 and thence to that terminal of the magnet 69 to which the conductor is connected.

The result is that when the stylus reaches the end of the sound groove at the edge of the first record, the contact finger 116 touches the contact 115 and energizes the counter-weight magnet 69 and the brake magnet 31, but not the arm-swinging magnet 78 nor the stylus-changing magnet 91. The outer record which has just been played is then dropped onto the lower support, the stylus passing over the edge of that record onto the face of the next adjacent record. At the same time the counter-weight 68 is shifted and the stylus, commencing its downward travel, engages the initial end of the sound groove of the next record and starts the reproduction of the latter. The next or second record (see the second record of the series in Fig. 4) has a surface contact 119 at the end of the sound groove near the lower end of the record which contact is engaged by the stylus when it reaches the end of the sound groove. This engagement results in the energization, as previously described, of the brake magnet 31, the magnet 78, and stylus changing magnet 91. This causes the changing of the stylus and the dropping of the record on to the lower support. At the same time the magnet 78 swings the reproducer arm and sound box to permit the descent of the record, this at the same time causing the contact 71 to complete the circuit 72 through the counter-weight magnet 70, shifting the counter-weight to institute the upward movement of the reproducer arm. On the deenergization of the magnet 78 the spring 69 immediately draws the arm back to bring the stylus against the next successive record and this operation is repeated until the machine is stopped or until the records have all been played.

From the foregoing it will be seen that records may be played in succession without intermission, making it possible to utilize two or more records to reproduce the different parts of the same long piece or selection, the reproduction proceeding without interruption between the separate records.

In order to provide means for skipping a record from time to time when desired, a switch 120 is provided which is adapted to



connect the circuit 121 containing the battery 122 with the conductor 80 and the conductor 81, thereby energizing the magnet 31 without affecting the other controlling devices of the machine. The closure of the switch 120, therefore, will cause the record to be dropped to the lower support and the machine to play the next adjacent record instead.

While I have herein shown and described for purposes of illustration one specific form of machine and as applied to a specific type of record, it is to be understood that the invention is limited neither to the particular form of machine nor to details of constructions shown, or to the specific form of record disclosed.

#### Claims:

1. In a multiple record phonograph the combination with reproducing means of a rotatable record support for holding a plurality of records in co-axial relation, means for causing engagement therewith of the reproducing means, and means for thereafter automatically effecting the transfer of said records each to another position on the said rotary support.

2. In a multiple record phonograph, the combination with a rotatable record support on which the record is mounted in co-axial relation thereto while being played of means for effecting the shifting of the record from the playing position on said support to another position on the same support.

3. In a multiple record phonograph, the combination with reproducing means of a rotary magazine support on which the records are held in co-axial relation thereto, means for automatically applying the reproducing means to the records in succession and withdrawing the same after the record has been reproduced and means for shifting a record from its position on the support after it has been reproduced, the record remaining on the said support while being reproduced.

4. In a multiple record phonograph, the combination with reproducing means of a support on which the records are held stacked one against another, means for automatically applying the reproducing means to the records in succession and for withdrawing the reproducing means after the record has been reproduced and means for shifting a record from its position on the support after it has been reproduced, the record remaining on the said support while being reproduced.

5. In a multiple record phonograph, the combination with a rotatable record support for holding a plurality of records in coaxial relation, a reproducer, means for moving the reproducer initially into contact with a record to reproduce the same, means for withdrawing the reproducer on the completion

of its reproduction, and means to effect the shifting of the record on and relatively to the said support to permit the application of the reproducer to the next adjacent record on the rotatable support.

6. In a multiple record phonograph the combination with a rotatable record support for holding a plurality of records in co-axial relation thereto, a reproducer, means for automatically moving the reproducer initially into contact with a record on said support to reproduce the same, means for automatically withdrawing the reproducer on the completion of its reproduction, and means thereafter to effect the shifting of the record to another position on the rotatable support.

7. A multiple record phonograph having reproducing means, a plurality of nested records arranged one within the other, and means for automatically presenting said records to said reproducing means to be played.

8. A multiple record phonograph having a record support, reproducing means, a plurality of records each consisting of a hollow truncated conical body held in nested relation on said support, and means for presenting said reproducing means to said records in succession.

9. A multiple record phonograph having a rotary record support, reproducing means, a plurality of records each consisting of a hollow truncated conical body held in nested relation on said support, and means for presenting said reproducing means to said records in succession.

10. In a multiple record phonograph the combination with means for holding in stacked relation a plurality of records, of reproducing means and electromagnetic means for controlling the shifting of a record from said stacked group.

11. A multiple record phonograph having reproducing means, a support for a plurality of records coaxially arranged and record selecting and presenting means passing through the records themselves for presenting successive records to the reproducing means.

12. A phonograph having a rotary record support, a traversing reproducer, a reproducer arm a counter-weight on the arm for controlling the traversing movement of the reproducer and means for automatically shifting the counter-weight to reverse the movement of the arm.

13. A multiple record phonograph having a removable record magazine, a motor, and means for rendering the motor inoperative on the removal of the magazine.

14. A multiple phonograph having a rotary record support for holding a plurality of records, means for reproducing said records in succession on said support, a rotary holder for receiving a reproduced record,

and means for automatically causing the transfer of records in succession after reproduction from said rotary support to said holder.

5 15. A multiple record phonograph having a rotary record support for holding a plurality of records, means for reproducing said records in succession on said support, a rotary holder for receiving a reproduced record, and electro-magnetic means for controlling the transfer of records in succession after reproduction from said rotary support to said holder.

15 16. A multiple record phonograph having a rotary record support, a plurality of records each consisting of a hollow truncated conical body held in nested relation upon said support and means for reproducing said records in succession thereon.

20 17. A multiple record phonograph having a rotary record support for holding a plurality of records, means for automatically reproducing said records in succession on

said support, a rotary holder for receiving a reproduced record, and electro-magnetic means for controlling the transfer of records in succession after reproduction from said rotary support to said holder. 25

18. A multiple record phonograph having a rotary record support for holding a plurality of records, means for automatically reproducing said records in succession on said support, the latter having also a rotary holder for receiving a reproduced record, and means for automatically causing the shifting of a reproduced record from its position of reproduction on said support to a position where it is received by said rotary holder. 30 35

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses. 40

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Witnesses:

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LAURENCE A. JANNEY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





AUTOMATIC STOP FOR PHONOGRAPHS,  
#1,227,334-----J. E. Soons,  
Patented-May 22nd, 1917.  
Filed-October 16th, 1916.

J. E. SOONS.  
 AUTOMATIC STOP FOR PHONOGRAPHS.  
 APPLICATION FILED OCT. 16, 1916.

1,227,334.

Patented May 22, 1917.

2 SHEETS—SHEET 1.

Fig. 1.

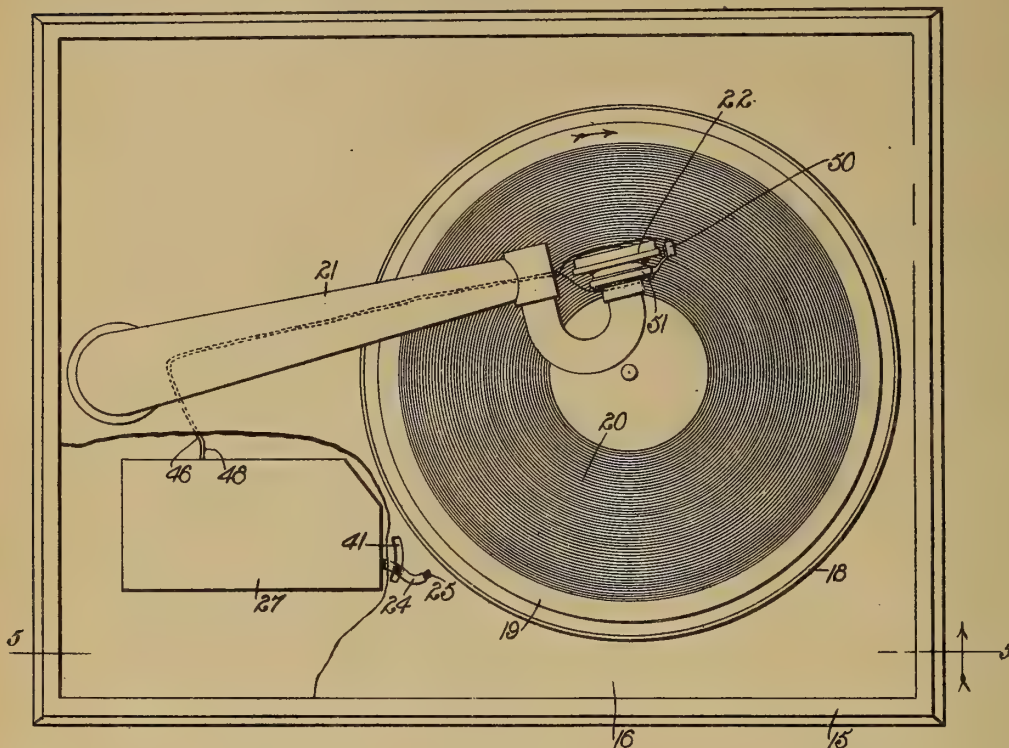
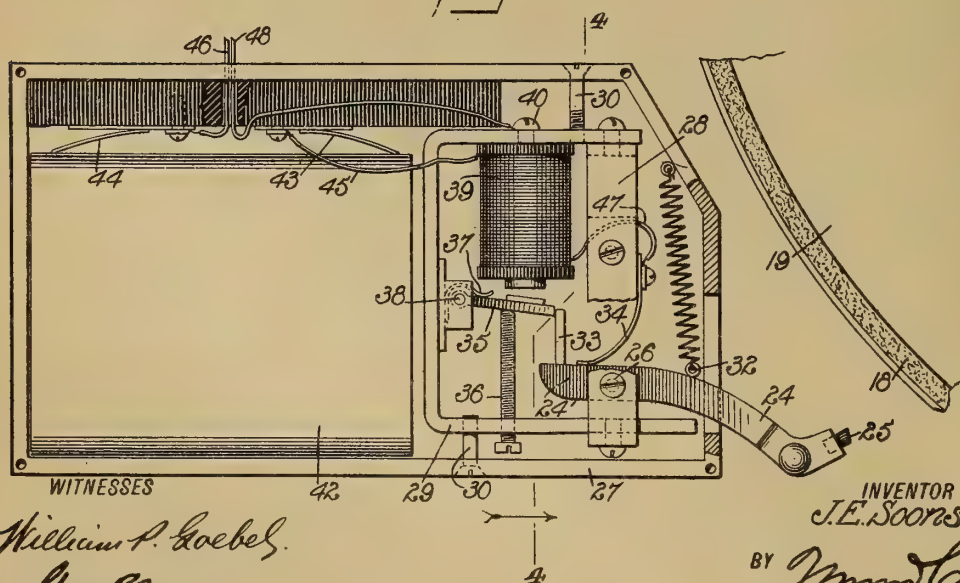


Fig. 2.



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1,227,334.

Patented May 22, 1917.  
 2 SHEETS—SHEET 2.

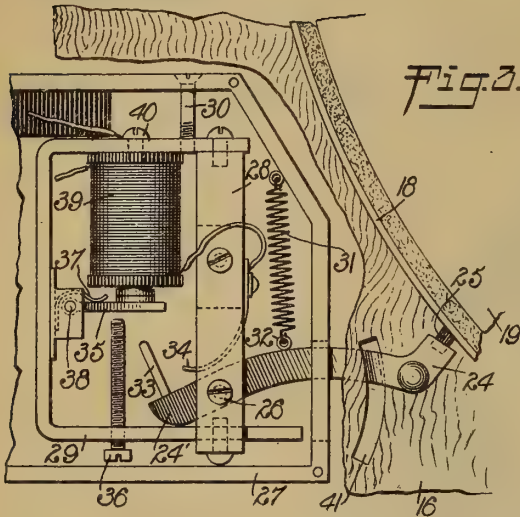


Fig. 3.

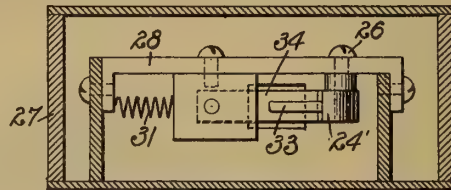


Fig. 4.

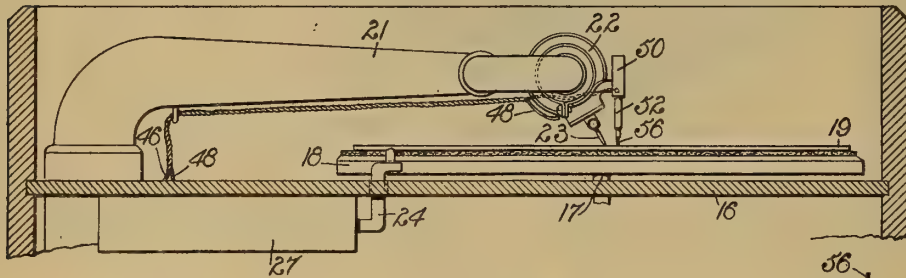


Fig. 5.

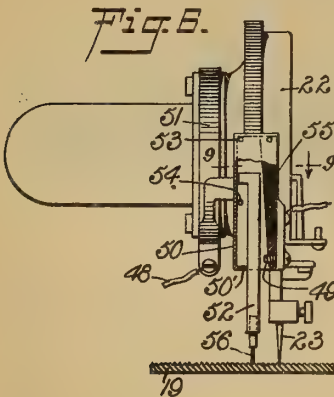


Fig. 6.

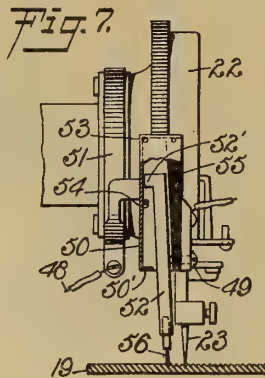


Fig. 7.

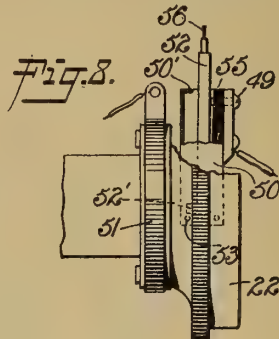


Fig. 8.

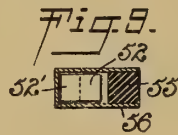


Fig. 9.

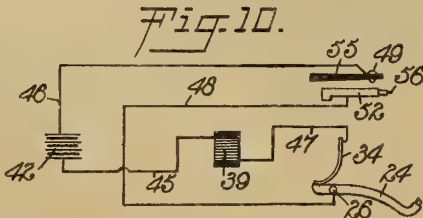


Fig. 10.

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# UNITED STATES PATENT OFFICE

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TO EDWARD CATERSON, OF NEW YORK, N. Y.

## AUTOMATIC STOP FOR PHONOGRAPHS.

1,227,334.

Specification of Letters Patent.

Patented May 22, 1917.

Application filed October 16, 1916. Serial No. 125,823.

*To all whom it may concern:*

Be it known that I, JAMES EDWARD SOONS, a subject of the King of England, and a resident of the city of New York, borough of the Bronx, in the county of Bronx and State of New York, have invented a new and Improved Automatic Stop for Phonographs, of which the following is a full, clear, and exact description.

This invention relates to automatic stops for sound producing machines, such as Victrolas, phonographs, Symphonolas, etc., but which are intended to be covered generically in this specification by the term phonograph.

I wish it to be understood also that while I show and describe a record disk having spirally arranged record grooves or lines, the advantages and adaptations of the invention are such that it may be applied to records of other types, so long as there is a record line or groove formed thereon. For convenience of description, therefore, I will use the term "disk" as referring to the body on which the grooves or lines are formed and the lines or the grooved portion of the disk will be regarded as a record as distinguished from the disk as a physical body.

I am aware that various devices have been proposed for accomplishing the broad purpose of this invention, but so far as I am aware the devices now in use all depend upon the setting of the devices according to the extent of each individual record or the length of the radius therefrom to the center of the turntable.

Among the objects, therefore, of this invention is to provide an automatic stop for phonographs which will be truly automatic in its nature, requiring no adjustment or other attention on the part of the operator either for starting or stopping the operation of the disk.

Another object of the invention is to provide an automatic stop that will be operative to stop the turntable either when the end of the record is reached or when the reproducer at any time is thrown over into its inoperative position irrespective of the portion of the record that may have been rendered.

Another object of the invention is to provide devices including a brush operating

adjacent to the needle, but in spaced relation thereto, while the record is being played, but which, when the reproducer is turned over to its inoperative position, will drop automatically out of the way of the needle so that it will not interfere with the usual exchange of needles. As a corollary to the object just stated, I provide a device including a brush which, operating in the record groove ahead of the needle, serves to clear the same from any dust or other extraneous matter which would tend to interfere with the proper musical effect.

A still further object of the invention is to provide an automatic stop for phonographs, in which there is employed an electromagnet in a circuit having a plurality of gaps or openings, at least one of which gaps is normally open, so that the energy for the magnet is expended only momentarily for the purpose of throwing the brake, the other gap being then automatically opened.

With the foregoing and other objects in view the invention consists in the arrangement and combination of parts hereinafter described and claimed, and while the invention is not restricted to the exact details of construction disclosed or suggested herein, still for the purpose of illustrating a practical embodiment thereof reference is had to the accompanying drawings, in which like reference characters designate the same parts in the several views, and in which—

Figure 1 is a plan view of a phonograph equipped with my improvement, a portion of the mechanism being broken away to better indicate the location of the brake controlling devices;

Fig. 2 is a plan view of the brake casing and parts therein in released position;

Fig. 3 is a view somewhat similar to Fig. 2, but indicating the brake in locked position;

Fig. 4 is a vertical transverse section on the line 4—4 of Fig. 2;

Fig. 5 is a vertical section through the phonograph casing on the line 5—5 of Fig. 1;

Fig. 6 is a front elevation of the reproducer and brush attachment thereon in normal running position, though with the gap,



with respect to the radius of the disk, between the needle and the automatic stop brush somewhat exaggerated;

Fig. 7 is a view similar to Fig. 6, but showing the approach of the needle to the brush at the end of the record for the purpose of stopping;

Fig. 8 is a view of the reproducer turned over into its idle position and with the brush dropped by gravity into that position, whereby the brake will be stopped automatically and the brush will be out of the way of the operator's fingers when manipulating the needle;

Fig. 9 is a sectional detail on the line 9—9 of Fig. 6, indicating the upper end of the brush arm in plan view and its relation to the hollow post in which it is supported; and

Fig. 10 is a diagram indicating the electromagnet and the contacts controlling the circuit therethrough.

Referring now more particularly to the drawings, I show at 15 a conventional form of phonograph cabinet or casing having a floor 16 therein, through which the shaft 17 of the turntable 18 projects in the usual manner. This turntable is shown as intended for supporting and rotating a disk 19, the record on which is indicated at 20. The tone arm is indicated at 21 and the reproducer at 22, to which is secured a needle 23 of any suitable character.

The brake mechanism includes a brake lever 24, the end or shoe 25 of which is adapted to bear against the periphery of the turntable 18 in the usual manner. The lever 24 is pivoted at 26 within the brake casing 27 and upon a cross bar 28 secured to or constituting a part of a frame 29 anchored in place within the casing by any suitable means, such as screws 30. A spring 31 is connected at one end at 32 to the brake lever and has its other end suitably anchored so that the normal tendency of the spring is to throw the brake into stopping position. The lever 24 has an extension 24' on the other side of the pivot 26 which carries a tail piece 33 and coöperates with a contact spring 34 when the brake lever is remote from the turntable or in running position. The contact 34, however, is spaced from the lever when the brake is set, see Fig. 3. When the brake lever is thrown to its running position, the end of the tail piece 33 snaps over the end of a trigger 35 held normally against the end of an adjustment screw 36 by means of a light spring 37. This trigger 35 is pivoted at 38 and constitutes in effect the armature of a small electromagnet 39 secured to or within the frame 29 as by means of a binding screw 40.

The brake casing 27 may be located at any convenient place either above or below the

floor 16, depending upon the internal construction of the phonograph casing. When located beneath the floor, the brake lever 24 may be bent upwardly and project through a slot 41 in said floor.

42 indicates a battery of any ordinary commercial type housed preferably within the casing 27 and has its contact springs 43 and 44 communicating electrically with circuit wires 45 and 46. The wire 45 leads to the magnet 39, thence through the magnet and wire 47 to the circuit breaker spring 34 in normal contact with the brake lever, the circuit being continued through the brake lever and frame 29 to a wire 48, which emerges from the casing 27 close to the wire 46. These wires 46 and 48 are directed along the tone arm to the reproducer, the wire 46 leading to a fixed contact 49 and the wire 48 leading to the brush support 50 through a metal band 51, whereby the brush support and contact 49 are secured to the reproducer.

52 indicates a brush arm of electric material, preferably of metal, and mounted in the brush arm support 50 for free endwise movement for a distance approximating the length of the average needle. The extent of endwise movement of the arm 52 is determined by the coöperation between the laterally extending lug 52' at its upper end and upper and lower pins 53 and 54, arranged in vertical alinement with each other within the side of the hollow brush arm support opposite from the block of insulation 55, to which the contact screw 49 is secured. The arm 52, except for the laterally projecting lug, is straight and preferably polygonal in cross section to prevent rotation thereof in the support 50. When the reproducer is lifted from the disk, the arm 52 drops freely by gravity until stopped by engagement with the pin 54, and the arm thus is suspended in a substantially vertical position, the upper end of the arm lying against the block of insulation 55 on the side opposite the pin 54 and the arm bears against a lip 50' on the opposite side from the block of insulation and directly below the pin 54. In this position, the arm is spaced from the fixed contact 49, making a gap in the circuit. A brush 56, of camel's hair or the like, is fitted in or to the lower end of the arm 52, the end of the brush being adapted to be received in a record groove when the reproducer is lowered straight down in the act of applying the needle 23 to the beginning of the record. It will thus be seen that the axes of the brush arm and the needle are normally parallel, as viewed from the front or at right angles to the radius drawn from the needle to the center of the disk, and the brush is spaced inwardly from the needle toward the center of the disk to a distance equal to one or more turns of the groove. As



viewed from the side, however, as in Fig. 5, it will be noted that the brush arm is substantially vertical while in operation, whereby the brush arm is supported normally only by the stiffness of the bristles or hairs constituting the brush. In this connection, it will be observed that the brush accommodates itself freely and readily to any length of needle which may be used.

With the device constructed and arranged as indicated in Fig. 6, the operator will bring the needle into playing position on the beginning of the record with the brush located slightly inwardly therefrom toward the center of the disk, and the brake will then be released in the usual manner to start the motor or, if desired, the motor may be started to initiate the rotation of the disk preliminary to the lowering of the needle.

In either event, the brush will maintain its uniform spaced relation with respect to the needle throughout the playing of the record, and the circuit being open between the arm 52 and fixed contact 49, the magnet will be idle and the brake will be held open by the trigger 35 coöperating with the tail piece 33. When the needle 23 approaches the end of the record, the brush will be received and retained in the last turn of the groove, see Fig. 7, and thereby the brush arm 52 will be tilted outwardly at the bottom due to the fact that the needle continuing in the spiral groove will cause the reproducer and tone arm to continue their movement toward the center of the disk. This lateral deflection of the brush arm serves to cause said arm to engage the fixed contact 49 when a record is completely played, and by completing the circuit through these fixed and movable contacts, the magnet 39 will be energized momentarily, withdrawing the armature trigger 35 from beneath the tail piece 33 and the brake will then be applied instantly by force of the spring 31. The circuit then will be broken at the contact 34, as shown in Fig. 3, so that no energy will be lost from the battery unnecessarily, the magnet having served its purpose when it actuates the armature to release the brake.

In the form shown, the brake remains in said position until subsequently manipulated by the operator. The reproducer may remain in the position indicated in Fig. 7 until another record is to be played. At the time desired, the operator will lift the reproducer and turn it up and over in the usual manner for the purpose of clearing the disk and changing the needles. In this position of the reproducer, the brush arm 52 rocks freely by gravity until the lug 52' thereof strikes against the pin 53, whereby the brush arm will tilt automatically into position to engage the fixed contact 49, although the brush 56 at this time will be below the needle and out of the way of the op-

erator's fingers. In this connection, I wish to emphasize the importance of this action of the brush arm with respect to the automatic stopping of the motor at any part of the record. For example, when a record has been started and the operator desires to stop the same, either for the purpose of substituting another record, or for any other reason, all he is required to do is to turn the reproducer up and over to the position of Fig. 8 and the brake will be automatically applied. When the record is to be proceeded with, the operator may then return the needle to its place at any part of the record and the motor will start when the brake is released. The device is simple and comparatively cheap in its construction and is easily applied to the reproducer of any ordinary machine and has proved to be absolutely reliable as a result of a number of months' actual use for any and all of the purposes above enumerated.

While the contact 49 is described herein for convenience as fixed, this term will be understood as being relative only with respect to the movable contact 50. It will be noted, however, that the contact screw 49 is adjustable for the purpose of determining the precise relation between the brush and the needle in practice, or rather the extent of relative movement between the needle and the brush before the contact for the circuit is completed.

I claim:

1. In an automatic stop for phonographs, the combination with a needle holder, a brake, and power means to set the brake, said power means including a normally open electric circuit, of a pair of normally spaced contacts in said circuit carried by the needle holder, the movable contact aforesaid being mounted for free vertical endwise slidable movement and positioned by gravity in spaced relation to the fixed contact and being tiltable laterally into engagement with the fixed contact when the end of the record is reached.

2. In an automatic stop for phonographs, the combination of a brake, power means tending to set the brake, electric devices tending to initiate the action of the power means aforesaid, an electric circuit associated with the electric devices, said circuit including a pair of relatively fixed and movable normally spaced contacts, the movable contact comprising a straight metal bar supported for free endwise up and down movements and adapted for lateral tilting to engage the fixed contact irrespective of its relative vertical position in its support, said contact devices being adapted to be inverted and to meet when they are so inverted.

3. The herein described means for automatically setting a brake, the same comprising an electric circuit, a vertical tubular

contact support, a contact fixed to the support, a relatively movable contact carried within the support and movable freely therein in endwise directions and also laterally with respect to the fixed contact, said movable contact being adapted to drop by gravity into position spaced from the fixed contact but being movable laterally by normal operation of the machine into position to engage the fixed contact.

4. The herein described means for automatically applying a brake, the same including an electric circuit, a contact support for the circuit, one branch of the circuit leading directly to the support, a fixed contact carried by the support to which the other branch of the circuit leads, a relatively movable contact carried within the support and having electric connection therewith, said movable contact being freely movable endwise in the support and adapted to assume a position automatically when starting the machine in spaced relation to the fixed contact but movable automatically by the normal operation of the machine into engagement with the fixed contact at the end of the record, and means carried by the contact support to limit the endwise movements of the movable contact therein.

5. In an automatic stop for phonographs, the combination of a tubular contact support, means to secure said support in a vertical position to a reproducer, an electric circuit, relatively fixed and movable contacts carried by the contact support, the fixed contact being adjacent the lower end of the support, the movable contact being slidable freely endwise within the support by the action of gravity, spaced means within the upper portion of the support coöperating with the upper end of the movable contact to limit the movements of the movable contact and serving thereby to determine the position of the movable contact with respect to the fixed contact, and brake devices set into operation by the closing of the circuit.

6. In an automatic stop for phonographs, the combination with a reproducer adapted to be swung upwardly around a transverse axis into inverted idle position, a contact support secured rigidly to the reproducer, relatively fixed and movable contacts carried by the support, said movable contact dropping freely by gravity into a position

spaced from the fixed contact when the reproducer is down, and means coöperating with the movable contact when the reproducer is inverted in idle position to cause the movable contact to gravitate into engagement with the fixed contact.

7. In an automatic stop for phonographs, the combination with a reproducer movable from its operative position upwardly into idle position, of a contact support carried by the reproducer and having fixed relation thereto in all positions of the reproducer, relatively fixed and movable normally spaced contacts carried by the support, the movable contact being movable automatically by gravity into its normal position when the reproducer is lowered to operating position, and means carried by the contact support serving to cause the movable contact to drop automatically by gravity into engagement with the fixed contact when the reproducer is moved into its idle position.

8. In an automatic stop for phonographs, the combination with a reproducer movable from operative to idle position, of a contact support secured in rigid position upon the reproducer, an electric circuit, a pair of normally spaced contacts for said circuit carried by the support, said movable contact being held from rotation with respect to the support, but being movable endwise and laterally with respect to the fixed contact, said movable contact having a lateral projection at one end, and means carried by the contact support coöperating with said projection and serving thereby to automatically position the movable contact spaced from the fixed contact when the reproducer is in operative position and against the fixed contact when the reproducer is in idle position.

9. In an automatic stop for phonographs, the combination with a brake and electric power means tending to set the brake, of a pair of normally spaced contacts carried by the reproducer, said contacts being brought automatically into engagement, either by the reaching of the end of the record or the inverting of the reproducer into idle position, for initiating the action of the power means aforesaid, and means coöperating directly with the brake to automatically break the circuit when the brake is thrown.

JAMES EDWARD SOONS.



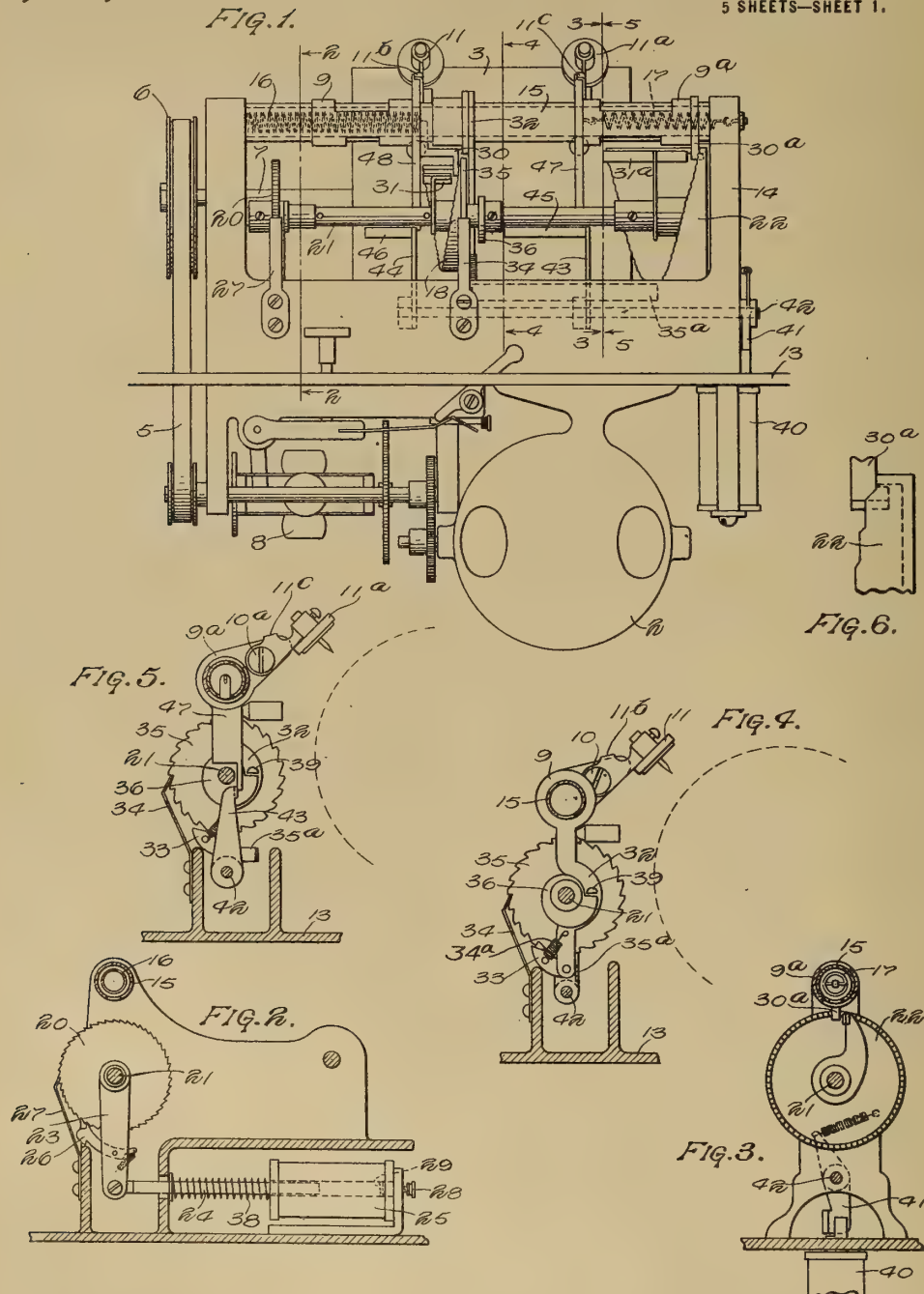
PHONOGRAPHIC TIME ANNOUNCER,  
#1,227,523-----J. G. Blessing,  
Patented-May 22nd, 1917.  
Filed-July 7th, 1913.

J. G. BLESSING.  
 PHONOGRAPHIC TIME ANNOUNCER.  
 APPLICATION FILED JULY 7, 1913.

1,227,523.

Patented May 22, 1917.

5 SHEETS—SHEET 1.



WITNESSES

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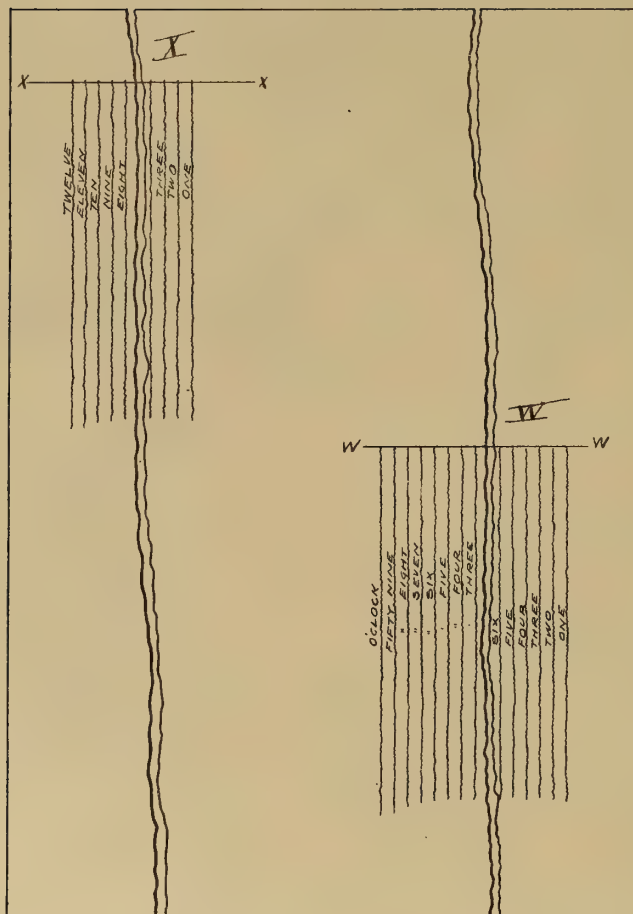
John G. Blessing  
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 ATTORNEYS,





1,227,523.

FIG. 7.



G. Yanochowski.

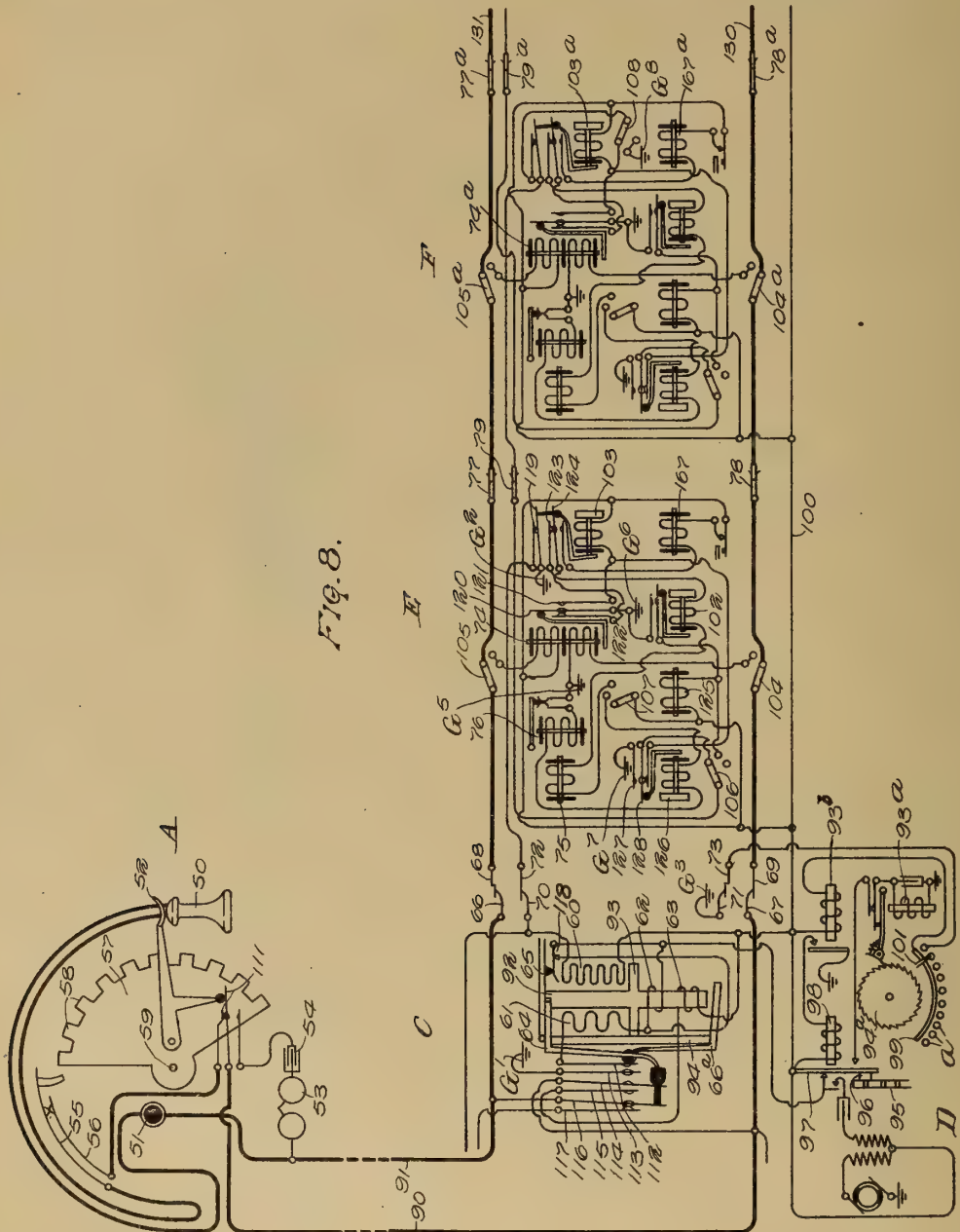
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J. G. BLESSING.  
 PHONOGRAPHIC TIME ANNOUNCER.  
 APPLICATION FILED JULY 7, 1913.

1,227,523.

Patented May 22, 1917.  
 5 SHEETS—SHEET 3.



WITNESSES  
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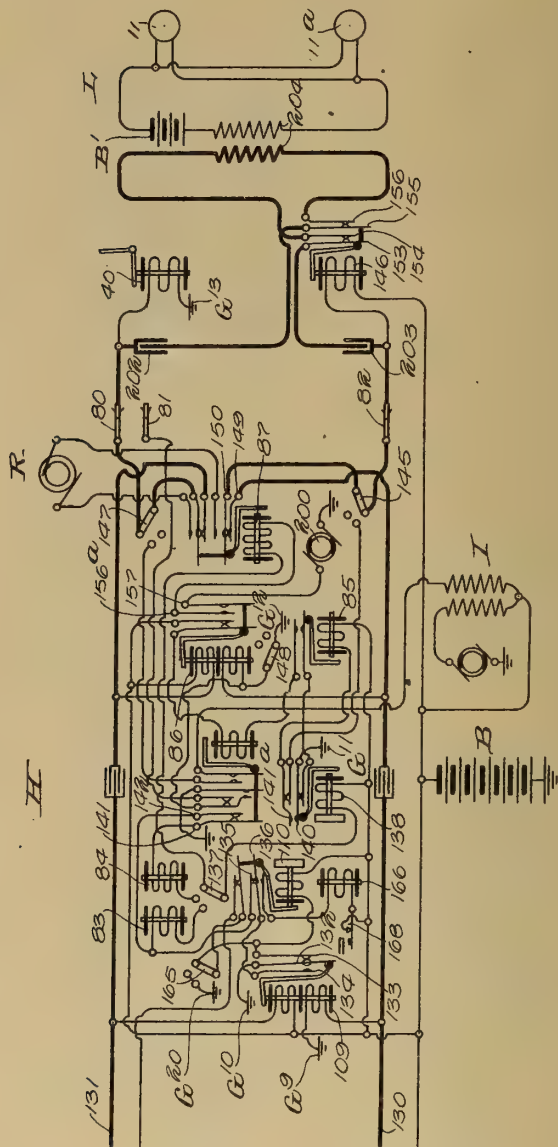


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Fig. 9.



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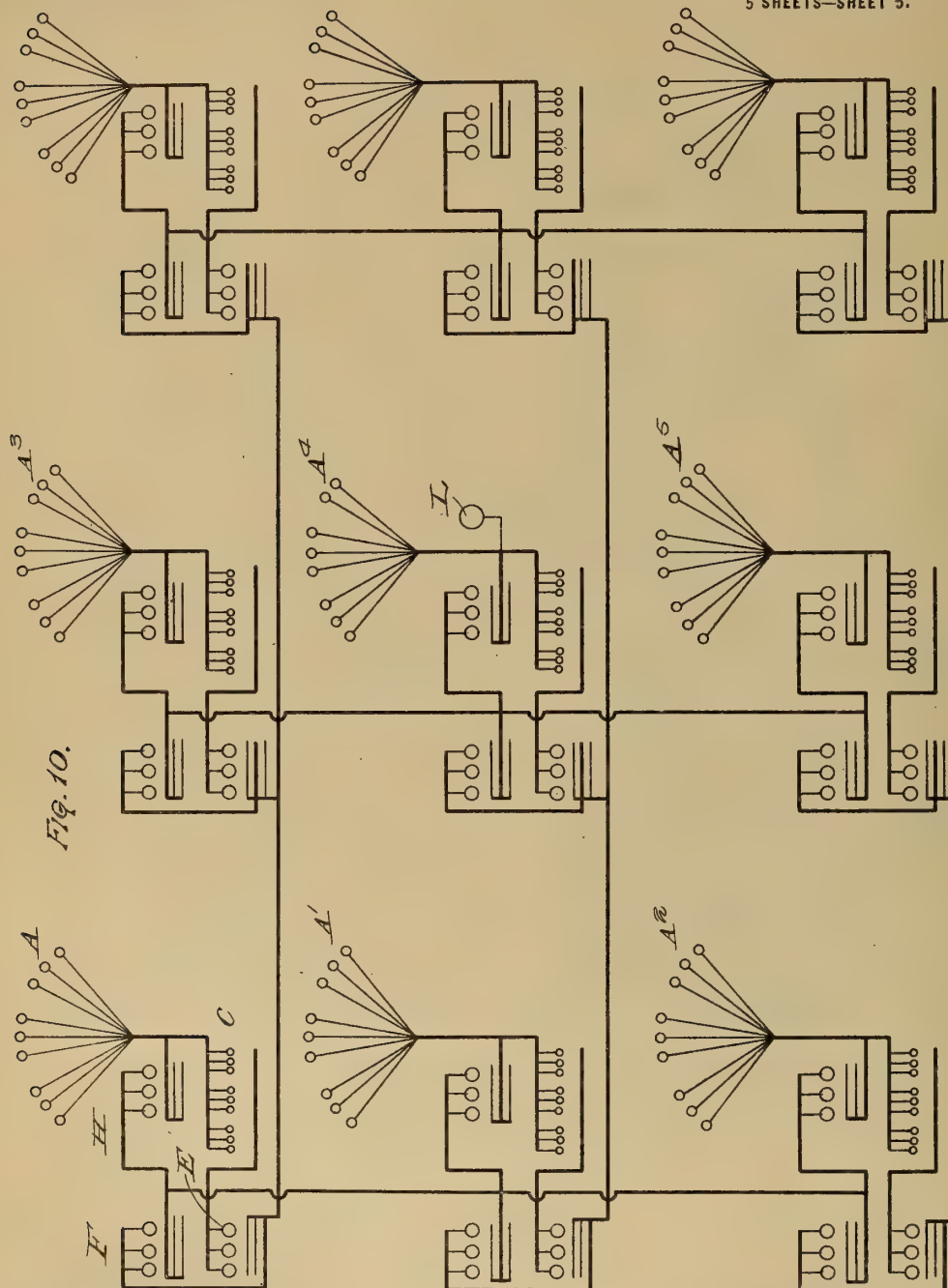




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 5 SHEETS—SHEET 5.



WITNESSES

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# UNITED STATES PATENT OFFICE.

JOHN G. BLESSING, OF CHICAGO, ILLINOIS, ASSIGNOR TO AUTOMATIC ELECTRIC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

## PHONOGRAPHIC TIME-ANNOUNCER.

1,227,523.

Specification of Letters Patent.

Patented May 22, 1917.

Application filed July 7, 1913. Serial No. 777,677.

*To all whom it may concern:*

Be it known that I, JOHN G. BLESSING, a citizen of the United States of America, and resident of Chicago, Cook county, Illinois, have invented certain new and useful Improvements in Phonographic Time-Announcers, of which the following is a specification.

My invention relates to improvements in phonographic time announcers and one of the features of my invention is the application of this time announcer to an automatic telephone system whereby a subscriber, by operating his calling dial, may ascertain the time of day or obtain other information contained on the phonograph record. My device is arranged so as to announce the minute and the hour and to repeat this announcement every few seconds for one minute and then shift to the next succeeding minute. In order to reduce the size or number of the records required to announce the time for twelve or twenty-four hours, I divide the record into two parts or two sets of grooves. These grooves, instead of being spiral grooves, as in the ordinary construction, are circular. One set of grooves, of which there are sixty, corresponds to the minutes and contains impressions corresponding to the numbers 1, 2, 3, etc., up to 59, the last groove containing the impression for the word "o'clock." The other set, of which there are twelve, corresponds to the hours and contains the impressions for the figures 1 to 12. A separate reproducer is provided for each set of grooves and the two sets of impressions are so arranged that they do not overlap each other, so that by placing one reproducer in engagement with the proper groove of one group and the other reproducer in the proper groove of the other group, their combined announcement may be made to correspond to the hour and minute of the day. Means are provided for moving the reproducer corresponding to the minute group from one groove to the next each minute and for moving the reproducer the hour group from one groove to the next each hour. When the reproducers have reached the last groove, they are automatically returned to a position to engage the first groove of the corresponding group and thus seventy-two grooves, sixty in one group and twelve in the other, are sufficient to announce any time of day, and each announcement will be

repeated as many times as the cylinder makes revolutions in a minute.

A further feature of my invention is the adaptation of this time announcer to an automatic telephone system, whereby any subscriber, by merely operating his calling dial to transmit the proper series of impulses, may establish connection with this time announcer and thus ascertain the time of day.

My invention will be more clearly understood by reference to the accompanying drawings, in which I have illustrated one embodiment of my invention and have illustrated the same in connection with an automatic telephone system of a well-known type.

Figure 1 is a front elevation of a phonographic time announcer embodying the principles of my invention.

Fig. 2 is a section taken on line 2—2 in Fig. 1.

Fig. 3 is a section taken on line 3—3 in Fig. 1.

Fig. 4 is a section taken on line 4—4 in Fig. 1.

Fig. 5 is a section taken on line 5—5 in Fig. 1.

Fig. 6 is a fragmentary view of the cams 18 and 22 (Fig. 1) on an enlarged scale, so as to show more clearly the conformation of their edges.

Fig. 7 is a diagram of the phonographic record.

Figs. 8 and 9 show a complete connection between a calling subscriber's telephone and the time announcer in a telephone system in connection with which I have chosen to illustrate my invention.

Fig. 10 represents diagrammatically the trunking arrangement of a telephone system embodying the principles of my invention.

Before describing the telephone system shown herein, a detailed description of the construction of the time announcer will be given. Referring to Fig. 1, there is mounted on the top of a suitable plate 13 a modified phonograph machine consisting of a frame 14 and cylinder 3, on which cylinder is a record with two sets of impressions, one set comprising a separate impression for each of the sixty minutes in an hour and the other set comprising a separate impression for each of the hours in a day. These impressions form complete rings around the record, unlike the usual impressions, which



are helical. The cylinder 3 is fastened to a shaft 7 which is in turn secured to the pulley 6. For the purpose of revolving the cylinder 3, there is mounted on the under side of the plate 13 a small motor 2 connected by means of a belt 5. The speed of the motor is governed by a suitable governor 8. Upon a shaft 15 there are mounted two carriages 9 and 9<sup>a</sup> for the purpose of carrying two microphone reproducers 11 and 11<sup>a</sup> back and forth, there being one set of reproducers for each set of impressions on the record, namely, the hour impressions and the minute impressions. The reproducers are pivotally mounted on carriages by means of the screws 10 and 10<sup>a</sup> (Figs. 4 and 5) in such a manner as to allow the reproducers to rest lightly on the record. These reproducers are provided with lugs 11<sup>b</sup> and 11<sup>c</sup> which extend over a portion of the edge of the carriages 9 and 9<sup>a</sup> so that they may be lifted from the record by tipping the carriages backward. The carriages 9 and 9<sup>a</sup> are arranged to slide back and forth independently of each other on the shaft 15, which is preferably hollow, and located inside of same are two helical springs 16 and 17. The purpose of these springs is to return the reproducers to their normal positions. For instance, the hour reproducer 11 is returned at the end of twenty-four hours and the minute reproducer is returned at the end of sixty minutes. The reproducer 11 is moved along the shaft 15 by means of the helical cam 18 against the compression of the spring 16, while the reproducer 11<sup>a</sup> is moved along against the pulling tension of the spring 17 by means of the helical cam 22, as will hereinafter be more fully described.

On the shaft 21 there is mounted a ratchet wheel 20 (Fig. 2) and adjacent thereto is an arm 23 which swings loosely on the shaft 21 and carries near its lower end a driving pawl 26 which engages with the teeth of the ratchet wheel 20. The lower end of the arm 23 is connected with the plunger 24 of a solenoid 25. Secured to the plunger 24 is a helical spring 38, so that when said plunger is drawn into the solenoid the spring 38 is compressed. Upon the deenergization of said solenoid, the power stored up in the spring 38 returns the plunger 24 to its normal position. In this way the arm 23 may be moved back and forth to rotate the ratchet wheel 20 and shaft 21 with a step-by-step movement. A holding pawl 27 is provided for the purpose of preventing all backward movement of the wheel 20 when the pawl is being moved back by the plunger 24 to engage with a new tooth. The plunger is regulated and allowed to be drawn back just so far by means of a metal disk 29 on the inside of the solenoid and a thumb screw 28, thus allowing the desired amount of clearance at the pawl 26. The helical cam 22 is mounted on and firmly secured to the shaft 21. This cam increases in height or width around its circumference by regular series of rather abrupt steps, as indicated more clearly in Fig. 6. On the right-hand end of the carriage 9<sup>a</sup> is a projection 30<sup>a</sup> which is, at the beginning of an hour, at the extreme right of the shaft 15 and in contact with the narrow portion of the cam 22. Upon the ratchet wheel 20 being rotated step by step in a manner already described, the cam 22 is also turned a corresponding distance, and as each of the steps in the cam passes the projection 30<sup>a</sup> of the carriage 9<sup>a</sup>, said carriage is moved a slight distance to the right, sufficient to move the reproducer 11<sup>a</sup> to the next impression on the record. During the beginning of each advancement of the cam 22, the projection 30<sup>a</sup> of the cam 9<sup>a</sup> moves forward a short distance with the step in the face of the cam before riding up over it. This forward movement of the projection 30<sup>a</sup> rocks the carriage 30<sup>a</sup> slightly on the shaft 15, whereby the reproducer is lifted off the record before it is moved laterally. Before the cam completes its movement, it passes the projection 30<sup>a</sup>, so that when the cam comes to rest, the reproducer drops back onto the record. This lifting of the reproducer while it is being moved laterally is to prevent the scratching of the record. The cam 22 is provided with fifty-nine steps on its surface, so that during one complete revolution of the cam, the reproducer is moved fifty-nine spaces to the left. On the sixtieth advancement the projection 30<sup>a</sup> slips off the high part of the cam and the spring 17 returns the carriage and reproducer to their normal positions. During this return of the carriage, the projection 30<sup>a</sup> bears on the guide 31<sup>a</sup> which is secured to and revolves with the cam 22 and serves to hold the reproducer off the record until it gets back to its normal position.

The reproducer 11 is moved along the record by the cam 18 in substantially the same manner in which the reproducer 11<sup>a</sup> is moved by the cam 22, as hereinabove explained. The cam 18, however, has only twenty-three steps on its surface and is adapted to make a complete revolution in twenty-four steps. The cam 18 is advanced one step on each complete revolution of the shaft 21 in the following manner: At 32 (Figs. 1 and 4) there is seen an arm loosely mounted on the shaft 15 and attached to the bottom of said arm is a pawl 33, together with the spring 34<sup>a</sup>, for the purpose of holding said pawl 33 constantly in contact with the ratchet wheel 35. The center of the arm 32 is arranged to fit around the shaft 21, as clearly shown in Fig. 4. The cam 18 is securely attached to the ratchet wheel 35 and both are mounted loosely on the shaft 21 and therefore do not revolve with the



ratchet wheel 20 and the minute cam 22, which are both secured to the shaft 21. There is fastened to the frame 14 a flat spring 35<sup>a</sup> that bears on the arm 32, holding it normally against the shaft 21 and at the same time holding the pawl 33 rigidly against the ratchet wheel 35. A spiral cam is shown at 36 which is securely fastened to the shaft 21 and consequently turns with each step-by-step movement of the ratchet wheel 20, which latter, it will be remembered, is operated by means of the energization and deenergization of the solenoid 25. As the cam 36 turns it pushes against a projection 39 on the movable arm 32, which arm is thereby pressed back against the tension of the spring 35<sup>a</sup> and draws the pawl 33 back a proportionate distance toward the next tooth on the ratchet wheel 35. When the highest part of the cam 36 reaches the projection 39, the arm 32 is forced back far enough to engage a new tooth of the wheel 35, and when the cam completes its revolution and the projection 39 slips off the high part of the cam, the arm 32 is returned to its original position by the spring 35<sup>a</sup>, and the wheel 35 is thereby advanced one step. Both reproducers are normally held off the record by the engagement of the tail pieces 47 and 48 of the carriage 9<sup>a</sup> and 9 with the bars 45 and 46, as indicated more clearly in Fig. 5. These bars are carried on the end of the arms 43 and 44 which are secured to a shaft 42, to which latter is also secured the armature 41 of an electromagnet 40 (Fig. 3). By the energization of the magnet 40, the shaft 42 is turned slightly to tip the bars 45 and 46 back far enough to permit the reproducers to drop down onto the record.

In Fig. 7 there is represented in a more or less diagrammatic form a cylindrical record for the time announcer described herein, said record being developed into a plain surface. At X are shown the record grooves corresponding to the hours. These grooves are twelve or twenty-four in number, each one comprising the proper impressions for reproducing some one of the words "one," "two," "three," etc., up to "twelve." If these grooves are twenty-four in number, the record impressions run from "one" to "twelve" and then repeat. This enables each groove to be used only during one hour of the twenty-four, while if only twelve grooves are used, each one would have to be used twice during the twenty-four hours, thereby decreasing the life of the record. The hour impressions on the record all begin approximately on a straight line  $x-x$  across the record and extend only about one-third or less of the distance around the cylinder. The minute impressions W are sixty in number, running from "one" to "fifty-nine," the sixtieth

being for the word "o'clock." The minute impressions all begin approximately on the line  $w-w$ , which is beyond the end of the longest impression of the hour group. The record is placed on the constantly rotating cylinder 3 (Fig. 1), with the reproducer 11 in position to engage the hour group of impressions X and the reproducer 11<sup>a</sup> in position to engage the minute group of impressions W. The reproducer 11 is set to engage the particular impression in the group X corresponding to the hour of the day and the reproducer 11<sup>a</sup> is set to engage the impression of the group W corresponding to the minute of the hour. It is thus seen that when the reproducers are in contact with the record, the time will be announced once during each revolution of the record, the reproducer 11 first announcing the hour and the reproducer 11<sup>a</sup> announcing the minute immediately thereafter. The cylinder is preferably revolved at the rate of fifteen or twenty revolutions per minute, so as to give an announcement every three or four seconds. The magnet 25 (Fig. 2) is connected with a suitable clock mechanism, which closes the circuit of the magnet once each minute to move the reproducer 11 to the next impression. At the beginning of each hour the reproducer 11<sup>a</sup> is moved from the "fifty-nine" impression to the "o'clock" impression and the reproducer 11 is moved over one step to the impression corresponding to the new hour. Although the reproducers are constantly in position to give the correct announcement, they are not always in actual engagement with the record, for, as has been explained, means have been provided for holding the reproducers off the record at all times except when an announcement is desired.

Having given a general description of the construction and mode of operation of the time announcer, I will now describe the telephone system shown herein and indicate how a subscriber may obtain connection with the time announcer. In Fig. 10 there is shown diagrammatically the trunking system in connection with which I have chosen to illustrate my invention. This drawing is on the scale of three to ten—that is, three lines represent ten lines in practice and three groups represent three groups, etc. The system is an automatic system of a well-known type, comprising subscribers' individual or line switches C, selectors E, second selectors F and connectors H. In the drawing there are represented three thousands of an exchange of ten thousand line capacity. The substations A are divided into groups A, A', A<sup>2</sup>, etc., usually of one hundred lines each. Therefore the groups A, A' and A<sup>2</sup> may represent one complete thousand and the groups A<sup>3</sup>, A<sup>4</sup> and A<sup>5</sup> another. With each group of subscribers' lines there is associ-



ated in the central office a group of line switches C, one switch for each line, a group of first selectors E, a group of second selectors F and a group of connectors H. The selector and connector switches represented herein comprise banks of contacts arranged in horizontal rows or levels shown diagrammatically by horizontal lines, indicating that corresponding contacts of all the line switches are multiplied together. All the line switches C belonging to a single group of subscribers' lines have common access to a group of first selectors E. The bank contacts of all the first selectors of corresponding hundreds are multiplied throughout the different thousands. The first level of bank contacts of these first selectors is connected to trunk lines leading to second selectors associated with the first thousand, the second level is connected with trunk lines leading to second selectors associated with the second thousand, and so on. The bank contacts of all the second selectors associated with a given thousand are multiplied together and the first level is connected to trunk lines leading to connector switches having access to the lines of the first hundred group of that thousand. The second level is connected to trunk lines leading to connectors of the second thousand, and so on. At L there is represented a time announcer which is connected to a set of bank contacts in a group of connectors. The private bank contacts of the set to which the time announcer is connected are preferably not multiplied between the different connectors of the group, so that a plurality of connections may be made with it simultaneously. This trunking system is in general well known in the art and it is not thought necessary to go into a minute description of it herein.

Referring now to Figs. 8 and 9, the subscriber's telephone is connected to the central office by means of two conductors 90 and 91 terminating at the switch C, which, by means of a plunger (not shown) and the bank springs 66 to 73 inclusive, extends the connection to a first selector E, which in turn extends the connection to the second selector F. This selector, in like manner, further extends the connection to the connector H (Fig. 9), in certain bank contacts of which terminates a line leading to the time announcer L. The telephone A is provided with a receiver 50, transmitter 51, ringer 53 and condenser 54. It is also provided with a suitable impulse-sending device, which may be similar to that described in British patent to S. G. S. Dicker No. 29,654 of 1910, and which is represented herein as comprising an impulse wheel 57, springs 55 and 56 and a dial (not shown) which has holes around its periphery for convenience in turning. The impulse wheel 57 and dial are secured to the same shaft, so

that as the dial is rotated forward, a number of impulse teeth 58 corresponding to the digit to be called are carried past the end of the spring 55, and as the impulse wheel returns to normal after the dial is released, each of these teeth, as they pass the end of the spring 55, momentarily forces said spring out of engagement with the spring 56.

The line switch C and master switch D are of the general type of line and master switches disclosed in British patent to R. W. James No. 26,301 of 1906, and more particularly of the form shown in British patent to T. G. Martin No. 1419 of 1910. As shown herein, the line switch C comprises, among other details, a plunger (not shown) which is attached to the end of a so-called plunger arm 65, which latter is controlled by a plural-wound magnet 92. The magnet 92 is also provided with armatures 64 and 66<sup>a</sup> and comprises four windings, namely, a pull-down winding 61, holding winding 60, line winding 63 and an auxiliary winding 62. The lateral projection 93 near the center of the core of the magnet, by means of which said magnet is mounted upon the bracket 94, divides the magnetic circuit of the magnet into two parts, so that the windings upon one end of the core do not have any effect on the armatures on the other end. Of the two windings 61 and 60, the former is the stronger, its function being to attract the plunger arm 65 and to thrust the plunger of the line switch into the bank terminals. The coil 60, although not strong enough to attract the plunger arm 65, will retain it in its operated position after it has once been pulled down. When the plunger is forced into the group of contact springs 66, 67, 68, 69, 70, 71, 72 and 73, it forces them into contact in pairs. Although only one set of springs 66—73 is shown, each switch is provided with a plurality of such sets, each set forming a terminal of a separate trunk line leading to a selector E. The plungers of all the line switches of the group which is controlled by the master switch D engage a so-called plunger guide shaft (not shown) and through the medium of said shaft are normally maintained opposite the terminals of an idle trunk line. The master switch consists essentially of a motor magnet 93<sup>a</sup> for rotating the ratchet wheel 94<sup>a</sup>. The ratchet wheel 94<sup>a</sup> is connected with the plunger guide shaft in such a manner that a rotary motion of the ratchet wheel gives to the plunger guide shaft an oscillatory motion to carry the idle plungers back and forth in front of their trunk terminals. To the plunger guide shaft there is secured a locking plate 95 provided near its outer edge with a number of openings which are adapted to be engaged by a pin 96 upon the end of the armature 97 of the locking relay 98.



The openings in the plate 95 are so spaced that the pin 96 can engage one of them and allow the armature 97 to resume its normal position only when the plungers of the idle line switches are directly opposite the terminals of a trunk line. The master switch is also provided with a bank of contacts comprising a common segment 99 and an individual contact  $\alpha$  for each trunk line to which the line switches have access. The wiper 101 always maintains the segment 99 in electrical connection with the individual contact  $\alpha$  of the trunk line before which the plungers of the idle line switches are being held by the master switch D.

The selector E is of the general type of selector switches disclosed in United States Letters Patent No. 815,321, granted March 13, 1906, to Keith, Erickson and Erickson, the circuits being modified, however, as shown in the above-mentioned British patent to T. G. Martin No. 1419 of 1910, in order to operate in a two-wire system. This selector comprises, among other details, a line relay 74, vertical and rotary magnets 75 and 76, private magnet 102, release relay 103 and the side switch wipers 104, 105, 106 and 107. The switch shaft (not shown), which has a vertical and rotary movement, and the line and private wipers 77, 78 and 79 are the direct means of connection between this switch and the next, namely, the selector F. The selector F is the same as the selector E with the exception that it possesses an extra side switch wiper 108. This selector extends the line connection in the usual manner to the connector switch H, which is of the same type as that disclosed in United States Letters Patent No. 815,176, granted March 13, 1906, to Keith, Erickson and Erickson, being slightly modified, however, in order to adapt the same for use in a two-wire system. The connector comprises, among other details, a line relay 109, vertical and rotary magnets 83 and 84, release relay 110, back-bridge relay 86 and a side switch controlled by the private magnet 85. Like the selectors E and F, this switch has the usual shaft which carries the wipers 80, 81 and 82 onto the contact of whatever line the subscriber happens to call. As shown at L, the reproducers 11 and 11<sup>a</sup> are connected in a local circuit with a battery B' and the primary winding of an induction coil 204. The secondary winding of the induction coil is adapted to be connected with the line bank contacts of the connector switches through the condensers 202 and 203 by means of the relay 146. The magnet 40 (Figs. 1 and 3) is included in a ground tap from one side of the line.

Upon the subscriber removing the receiver 50 from the switch hook 52, the springs 111 are brought into contact, closing a circuit through the line winding 63 of the line

switch C, which winding, upon energizing, attracts the armature 66<sup>a</sup>, causing the springs 112 and 113 to make contact and close a circuit from ground G' through the pull-down winding 61 and the auxiliary winding 62 to the battery lead 100. The winding 61, upon becoming energized, attracts the plunger arm 65 and the small armature 64 the latter operating to separate the springs 113 and 114, 115 and 116 and at the same time to make contact between the springs 116 and 117. The operation of the plunger arm thrusts the plunger into the bank terminals to connect the line through the first selector E and to also break the circuit of the winding 63. The armature 66<sup>a</sup> does not immediately fall back by the de-energization of the line relay 63 owing to the winding 62 being in series with the pull-down winding 61. The plunger arm, upon being completely drawn down, closes the contact of the springs 118 to shunt the auxiliary winding 62, thus allowing the armature 66<sup>a</sup> to fall back at this time. Before the armature 66<sup>a</sup> falls back to break the circuit of the winding 61, a circuit has been closed from ground G<sup>2</sup> through the contact of the springs 119 in the selector switch E by way of the bank springs 72 and 70 and through the holding coil 60 to the battery lead 100. The circuit of the relay 103 in the selector is closed by the line relay 74, which is energized when the line connection is extended to the selector by the engagement of the springs 66 and 68 and 67 and 69. Upon the springs 71 and 73 being pressed together by the plunger of the line switch C, a circuit is closed from the ground G<sup>3</sup> through said springs and by way of the arm 101 and through the relay 93<sup>b</sup> to battery, to operate the master switch in a well-known manner to move the remaining plungers to the next idle trunk.

The above operations follow immediately upon the subscriber removing his receiver from the switch hook preparatory to operating his dial for the first digit. We will assume that the number to be called to obtain connection with the time announcer is 2220. The subscriber now operates his dial in the usual manner for the first digit 2, thereby causing the contact of the springs 55 and 56 to be broken twice momentarily, thereby de-energizing the line relay 74 a corresponding number of times. This momentary de-energization allows the spring 120 to make contact with the springs 122 twice, thus sending two impulses through the vertical magnet 75, said circuit being traced from ground G<sup>4</sup> through the contact of springs 120 and 122, contact of springs 124 and 123, private relay 102 and through the vertical magnet 75 and the side switch wiper 107 to the battery lead 100. Upon the vertical magnet being operated twice momentarily, the switch 130



shaft is raised two steps opposite the row of contacts in which terminates the trunk line leading to the second selector F. The relay 103 being slow acting retains its armature all the time impulses are being transmitted. Likewise, the private relay 102 being slow acting is also maintained in operated position until the last impulse has been transmitted, at which time its armature falls back to break the circuit of the private magnet 125, which allows the side switch to pass from first to second position, thereby transferring battery current by means of the side switch wiper 107 from the vertical magnet 75 to the rotary magnet 76, which latter operates to automatically rotate the wipers onto an idle contact. The circuit of the rotary magnet is as follows: from ground  $G^5$  through the interrupter springs of said magnet, slow acting relay 126, side switch wiper 107 to the battery lead 100. The function of the slow acting relay 126 is to place a guarding potential from ground  $G^7$  onto the private contact 79 immediately upon the wipers coming to rest, so as to insure against another selector engaging these contacts before the switch ahead has time to throw back the guarding potential from ground  $G^8$ . This circuit is traced from ground  $G^7$  through the contact of springs 127 and 128 and the side switch wiper 106 to the private wiper 79.

Upon the line connection being extended to the second selector F, the line relay 74<sup>a</sup> and the slow relay 103<sup>a</sup> are energized in a manner similar to that described for the first selector E. The subscriber now turns his dial for the second digit 2, thereby operating the selector F in precisely the same manner as the selector E to raise and rotate the line wipers 77<sup>a</sup> and 78<sup>a</sup> and wiper 79<sup>a</sup> onto an idle trunk line leading to the connector H. Upon the connection being extended to the connector, the line relay 109 is energized, together with the relay 110, the circuit of the former being traced from ground  $G^9$  through the lower winding of the relay 109, conductor 130, line wiper 78<sup>a</sup>, side switch wiper 104<sup>a</sup>, line wiper 78, side switch wiper 104, bank springs 69 and 67, conductor 90, through the subscriber's telephone, back over the conductor 91, bank springs 66 and 68, side switch wiper 105, line wiper 77, side switch wiper 105<sup>a</sup>, line wiper 77<sup>a</sup>, conductor 131 (Fig. 9), through the upper winding of the relay 109 to battery B and to ground G. The circuit of the relay 110 is traced from ground  $G^{10}$  through the contact of springs 132 and 133 and through the relay 110 to the battery B. The central office is now in a position to receive the impulses for the third digit 2, upon which the subscriber operates his dial in the usual manner to interrupt the circuit of the line relay 109 twice momentarily. Each

time the line relay deenergizes, a circuit is closed from ground  $G^{10}$  through the contact of springs 132 and 134, contact of springs 136 and 135 and through the vertical magnet 83, side switch wiper 137 and through the private relay 138 to battery B. The vertical magnet 83 is energized twice to raise the shaft wipers 80, 81 and 82 two steps opposite the row of contacts in which is situated the terminals of the line leading to the speaking clock L. The private relay 138 operates in a manner similar to that of the relay 102 in the selector E to close the circuit of the private magnet 85 while the vertical magnet is operating. This circuit extends from ground  $G^{11}$  through the contact of springs 140 and 141<sup>a</sup>, through the private magnet 85 to battery B. After the last impulse of the series has been transmitted, the relay 138 deenergizes, thereby breaking the circuit of the private magnet 85, which in turn deenergizes and allows the side switch to pass to second position. The passing of the side switch wiper 137 to second position transfers the battery connection from the vertical magnet 83 to the rotary magnet 84. The subscriber now operates his dial for the last digit 0, thereby causing the line relay 109 to deenergize ten times to transmit a series of ten impulses through the rotary magnet 84. The circuit for the rotary magnet is traced from ground  $G^{10}$  through the contact of springs 132 and 134, springs 136 and 135, contact of springs 141 and 142 and through the rotary magnet 84 and private relay 138 to battery B. The private relay again breaks the circuit of the private magnet 85 at the cessation of the impulses to release the side switch to third position. As is well known, the private contacts of one connector are generally wired to the corresponding contact in all other connector switches of the same group for the purpose of protecting a called line from being engaged by more than one subscriber at a time. Upon the side switch wipers 145 and 147 passing to third position, circuits are closed through the upper winding of the relay 86 and the magnet 40 and through the lower winding of the relay 86 and relay 146, the latter circuit being traced from ground  $G^{12}$  through the side switch wiper 148, lower winding of the relay 86, contact of springs 149 and 150, side switch wiper 145, line wiper 82 and through the relay 146 to battery B. The former circuit is traced from battery B, upper winding of the relay 86, side switch wiper 147, line wiper 80 and through the magnet 40 to ground  $G^{13}$ . Upon the relay 146 becoming energized, the talking circuit is closed at the springs 153, 154, 155 and 156. Upon the relay 86 becoming energized, the springs 156<sup>a</sup> and 157 break contact, so as to prevent the circuit of the ringer relay becoming



closed when the side switch wiper 137 passes to third position, at which time battery current is transferred from the rotary magnet 84 to said ringer relay. The springs of the ringer relay 87 are adjusted with much more tension than those of the relay 86, so as to enable the last-mentioned relay to pull up before the ringer relay 87 should the circuit of the ringing interrupter 200 be closed. Upon the energization of the magnet 40, the reproducers 11 and 11<sup>a</sup> are lowered onto the record in the manner explained in connection with Figs. 1, 2, 3, 4, 5 and 6, whereby the time of day is announced to the calling subscriber.

After the subscriber has learned the time, he may release the connection by hanging up his receiver. Upon the hanging up of the receiver at the substation A, the circuit of the connector line relay 109 is broken, and said relay deenergizes to open the circuit of the connector release relay 110, as well as the holding circuit of the release relays 103<sup>a</sup> and 103 of the selectors F and E, respectively, this holding circuit being transferred from ground G<sup>20</sup> by the passing of the connector side switch wiper 165 from second to third position. The relays 110, 103<sup>a</sup> and 103, upon deenergizing, close the circuits of the release magnets 166, 167<sup>a</sup> and 167 of their respective switches. These circuits are all similar to each other, that for the connector release magnet extending from ground G<sup>10</sup> through the springs 132 and 134, back contact of the spring 136, release magnet 166 and off-normal contact 168. The mechanism of the respective switches is restored to normal position immediately upon the energization of the magnets 166, 167<sup>a</sup> and 167 and the circuits of the magnets are broken at the shaft-controlled off-normal contacts when the shafts reach their lowest positions.

The relay 103 of the selector E not only closes the circuit of the release magnet 167, but destroys the holding circuit of the winding 60 of the switch C, which deenergizes and allows the plunger arm of said switch to return to normal position.

It will thus be seen that I have devised a very efficient phonographic announcer, and while I have illustrated one specific embodiment of my invention and have shown this in connection with an automatic telephone system of a particular type, it will, of course, be understood that my invention is capable of many modifications and changes. Thus, while I have shown the cylinder provided with two groups of impressions and two reproducers in order to record the time of day, it is obvious that the record might be provided with a separate impression for each minute of the twelve hours and only one reproducer employed, which reproducer would be stepped along one step each minute and returned to its starting point once in twelve

hours. Likewise, while I have referred to my announcer as a time announcer, it is, of course, understood that this device can be used for imparting any other information, or for advertising purposes, or, if desired, these features can be combined, as, for example, each groove could contain a time announcement together with some advertisement, or items of news could be interpolated when desired. Likewise, I do not wish to be limited to the form of telephone system with which I have chosen to illustrate my invention, as it is obvious that my invention is adapted for use in connection with other forms of automatic or semi-automatic systems.

What I claim as my invention is:—

1. In a telephone system, subscribers' lines, an automatic announcer, and automatic progressively movable means controlled by a calling subscriber for establishing connection between any of said subscribers' lines and said announcer.

2. In a telephone system, subscribers' lines, automatic progressively movable switches associated with said lines, a phonographic announcer, and means under the control of a calling subscriber for operating said switches to establish connection with said announcer.

3. In a telephone system, subscribers' lines, a phonographic announcer, an automatic connector switch, means for establishing connection from any one of said lines to said connector, and means controlled by a calling subscriber for then operating said connector to establish connection with said announcer.

4. In a telephone system, subscribers' lines, a phonographic announcer, an automatic connector switch, means for establishing connection from any one of said lines to said connector switch, bank contacts with which said connector is adapted to establish a connection, connections from certain of said contacts to the subscribers' lines, and connections from other of said contacts to said announcer.

5. In a telephone system, subscribers' lines, a phonographic announcer, an automatic connector switch, means for establishing connection from any one of said lines to said connector switch, bank contacts with which said connector is adapted to establish a connection, connections from certain of said contacts to the subscribers' lines, connections from other of said contacts to said announcer, a source of ringing current, a ringing relay for said connector for automatically connecting said ringing current to a subscriber's line when said connector makes connection with one of said lines, and means for breaking the circuit of said ringing relay when said connector makes connection with said announcer.



6. In a telephone system, a subscriber's line, a phonographic announcer, an automatic connector switch, means for establishing connection from said line to said switch, bank contacts with which said connector is adapted to make contact, normally open connections between certain of said contacts and said announcer, means for operating said switch, and means for closing said normally open connections when said switch engages with one of the contacts associated with the announcer.

7. In a telephone system, a subscriber's line, a phonographic announcer, an automatic connector switch, means for establishing connection from said line to said switch, bank contacts with which said connector is adapted to make contact, normally open connections between certain of said contacts and said announcer, means for operating said switch, means for closing said normally open connections when said switch engages with one of the contacts associated with the announcer, a source of ringing current, a ringing relay for said connector for automatically connecting said ringing current to the subscriber's line when said connector makes connection with said line, and means for breaking the circuit of said ringing relay when said connector makes connection with said announcer.

8. In a telephone system, subscribers' lines, a phonographic announcer comprising a record and a stylus normally disengaged from said record, automatic switches for establishing connection from said lines to said announcer, and means operating to permit said stylus to engage said record upon the establishment of said connection.

9. In a telephone system, subscribers' lines, a phonographic announcer comprising a record and a stylus normally held out of contact with said record, an automatic connector switch, means for establishing connection from any one of said lines to said connector switch, means for then operating said connector switch for establishing connection with said announcer, a relay adapted to be energized when such connection is established, and means controlled by the energization of said relay for permitting said stylus to engage said record.

10. In a telephone system, subscribers' lines, a phonographic announcer, an automatic connector switch, means for establishing connection from one of said lines to said switch, bank contacts with which said connector is adapted to contact, normally open connections between certain of said contacts and said announcer, connections from other of said contacts to subscribers' lines, a relay, means controlled by said relay for closing said normally open connections when said switch engages with one of the contacts associated with said announcer, a source of

ringing current, a ringing relay for said connector for automatically connecting said ringing current to one of said subscribers' lines when said connector makes connection with such line, another relay for said connector, and means controlled by said other relay for breaking the circuit of said ringing relay when said connector makes connection with said announcer.

11. A phonographic announcer, a plurality of lines associated therewith, means for extending any one of said lines to said announcer, a receiver for said extended line, a first and a second reproducer for said announcer for affecting said receiver, one record for said first reproducer, several records for the second reproducer, means for placing said reproducers in operative engagement with their records, said means controlled over the extended line, means for shifting said second reproducer from one record to another.

12. A phonographic announcer, a plurality of lines associated therewith, means for extending any one of said lines to said announcer, a receiver for said extended line, a first and a second reproducer for said announcer for affecting said receiver, one record for said first reproducer, several records for the second reproducer, means for placing said reproducers in operative engagement with their records, said means controlled over the extended line, means for shifting said second reproducer from one record to another, whereby the receiver may respond to the record of the first reproducer and to a plurality of records of the second reproducer while the first reproducer is retained in operative engagement with its record.

13. A phonographic announcer, a plurality of lines associated therewith, automatic means for extending any one of said lines to said announcer, a receiver for said extended line, a first and a second reproducer for said announcer for affecting said receiver, one record for said first reproducer, several records of the second reproducer, means for placing said reproducers in operative engagement with their records, said means controlled over the extended line, and means for shifting said second reproducer from one record to another.

14. A phonographic announcer, a plurality of lines associated therewith, automatic trunking means for extending any one of said lines to said announcer, a receiver for said extended line, a first and a second reproducer for said announcer for affecting said receiver, one record for said first reproducer, several records for the second reproducer, means for placing said reproducers in operative engagement with their records, said means controlled over the extended line, and means for shifting



said second reproducer from one record to another.

15. A phonographic announcer, a plurality of lines associated therewith, automatic trunking means comprising a plurality of progressively movable switches for extending any one of said lines to said announcer, a receiver for said extended line, a first and a second reproducer for said announcer for affecting said receiver, one record for said first reproducer, several records for the second reproducer, means for placing said reproducers in operative engagement with their records, said means controlled over the extended line, and means for shifting said second reproducer from one record to another.

16. A phonographic announcer, a plurality of lines associated therewith, means for extending any one of said lines to said announcer, a receiver for said extended line, a first and a second reproducer for said announcer for affecting said receiver, a plurality of records for said first reproducer, several records for the second reproducer, means for placing said reproducers in operative engagement with their records, said means controlled over the extended line, means for shifting said second reproducer from one record to another, whereby the receiver may respond to the record of the first reproducer and to a plurality of records of the second reproducer while the first reproducer is retained in operative engagement with its record, and means for shifting said first reproducer from one record to the other.

17. A phonographic announcer, a plurality of lines associated therewith, means for extending any one of said lines to said announcer, a receiver for said extended line, a first and a second reproducer for said an-

nouncer for affecting said receiver, a plurality of records for said first reproducer, several records for the second reproducer, means for placing said reproducers in operative engagement with their records and for withdrawing them from such engagement, said means controlled over the extended line, means for shifting said second reproducer from one record to another, whereby the receiver may respond to the record of the first reproducer and to a plurality of records of the second reproducer while the first reproducer is retained in operative engagement with its record, and means for shifting said first reproducer from one record to the other before said withdrawing means operates to withdraw said reproducer from operative engagement with their records.

18. A phonographic announcer, a plurality of lines associated therewith, means for extending any one of said lines to said announcer, a receiver for said extended line, a first and a second reproducer for said announcer for affecting said receiver, one record for said first reproducer, several records for the second reproducer, means for placing said reproducers in operative engagement with their records and for withdrawing them from such engagement, said means controlled over the extended line, and means for shifting said second reproducer from one record to another before said withdrawing means operates to withdraw said reproducer from operative engagement with their records.

Signed by me at Chicago, Cook county, Illinois, this 28th day of June, 1913.

JOHN G. BLESSING.

Witnesses:

ALBERT ANDERSEN,  
GEORGE YANOWSKI.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



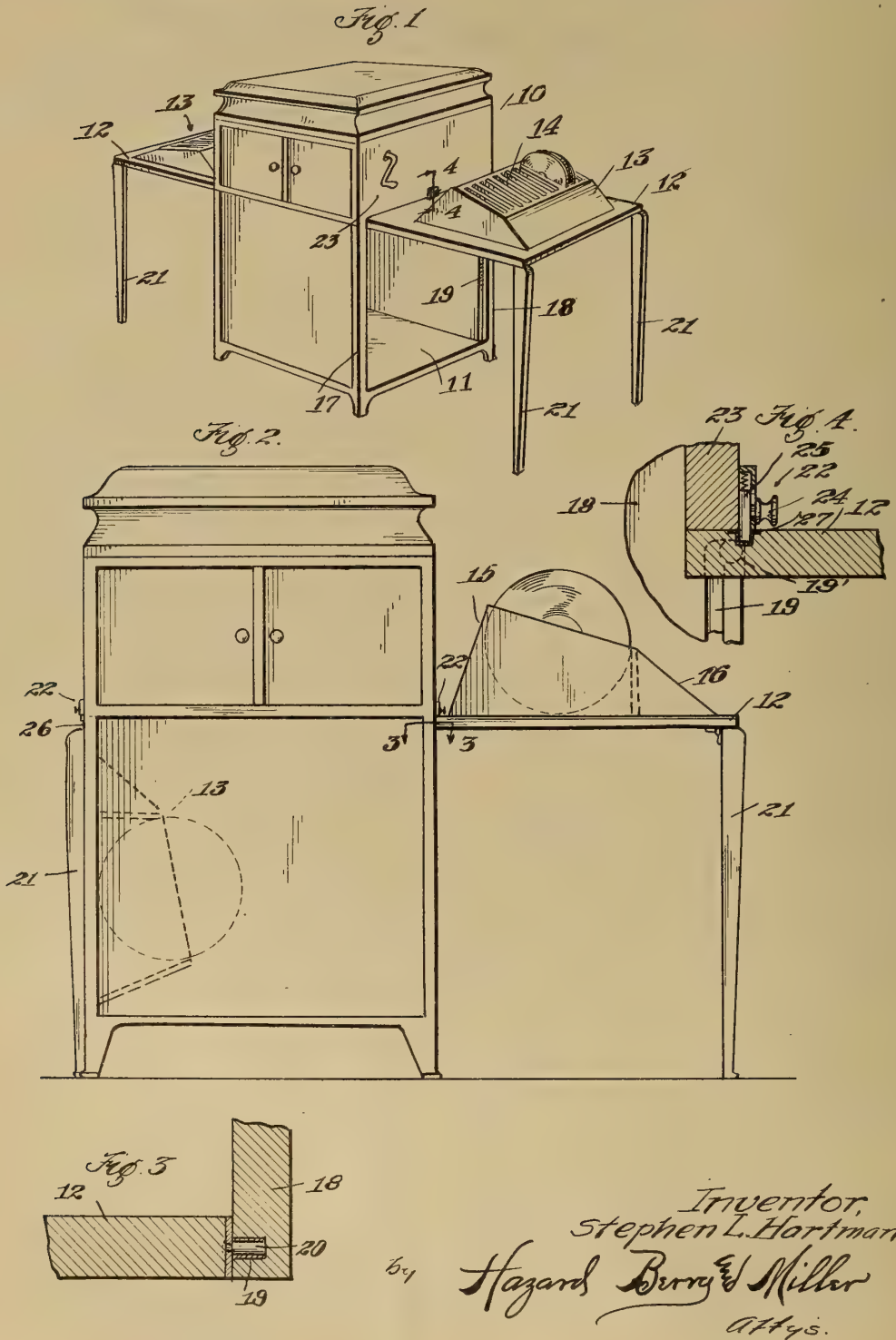
PHONOGRAPH CABINET,  
#1,227,536-----S.L.Hartman,  
Patented-May 22nd, 1917.  
Filed-February 24th, 1916.



S. L. HARTMAN.  
 PHONOGRAPH CABINET.  
 APPLICATION FILED FEB. 24, 1916.

1,227,536.

Patented May 22, 1917.



# UNITED STATES PATENT OFFICE.

STEPHEN L. HARTMAN, OF FILLMORE, CALIFORNIA.

## PHONOGRAPH-CABINET.

1,227,536.

Specification of Letters Patent.

Patented May 22, 1917.

Application filed February 24, 1916. Serial No. 80,183.

*To all whom it may concern:*

Be it known that I, STEPHEN L. HARTMAN, a citizen of the United States, residing at Fillmore, in the county of Ventura and State of California, have invented new and useful Improvements in Phonograph-Cabinets, of which the following is a specification.

My invention relates to a phonograph cabinet.

It is an object of this invention to construct a phonograph cabinet which has a chamber for holding the disk records and which chamber is provided with a pair of sliding side panels. On the inner walls of the sliding panels record containers are mounted. Each sliding panel is provided at its lower end with a pair of laterally projecting pins which slidably engage vertical grooves in the adjacent walls of the record chamber. A pair of foldable legs are hinged to the upper corners of the panel. A locking device is provided to retain the panel in its normally closed position. When it is desired to use the records, the locking device is operated, allowing the panel to be moved to a horizontal position so that the same will be in a plane with the upper end of said chamber. The foldable legs support the outer horizontal end of the panel and the locking device retains the panel in operative position. The sliding panel when in its horizontal position has the form of a small table on the top of which the record container is mounted, and the records are in the most convenient position for playing the phonograph. When it is desired to move the panel into its normal vertical position so that the records will be within the record chamber, the locking device is operated and the panel is slid into place, while the foldable legs are moved in position close against the vertical edges of the cabinet.

With the above and other objects in view which will appear as the description proceeds, my invention consists in the construction, arrangement and combination of parts hereinafter described and claimed.

In the accompanying drawings which form a part of this specification, I have illustrated a convenient and practical embodiment of my invention, and in which:

Figure 1 is a perspective view of a phonograph cabinet provided with a pair of slid-

ing panels arranged on opposite sides, said panels being shown in their operative horizontal position.

Fig. 2 is a front elevation of the cabinet showing the left hand sliding panel in normal or closed position and the right hand panel in extended or operative position.

Fig. 3 is a detail section on an enlarged scale on line 3—3, Fig. 2.

Fig. 4 is a detail section on an enlarged scale of the locking device on line 4—4, Fig. 1.

In the drawings, 10 designates a phonograph of any suitable or preferred construction having below its sound reproducing mechanism, a rectangular box shaped record chamber 11. The record chamber is provided with a pair of movable or sliding side panels 12 arranged on opposite sides thereof. The construction of the side panels is exactly alike, and therefore the description will be limited to only one of them. It will be understood that the record chamber may be provided with but one slidable side panel, but it is preferable to have two such panels arranged on opposite sides, as shown. On the inner face of the side panel 12, a record container 13 is securely mounted. The same is box shaped and provided with a suitable number of parallel slots 14 in which the disk records are removably mounted. It should be noted that the lower end wall 15 of the container is wider than the upper end wall 16, the lower end wall being upwardly inclined so that the center of each disk record falls within said lower end wall when the side panel is in its normal closed position, whereby the records will be prevented from falling out of the container. (See Fig. 2.) The front wall 17 and the rear wall 18 of the record chamber are provided at their vertical sides with vertical grooves 19 which are adjacent to the vertical edges of the panel 12. These grooves are adapted for the reception of a pair of anti-friction rollers or pins 20 laterally extending from the lower ends of the vertical edges of the panel 12 to which they are securely fastened. A pair of hinged legs 21 are secured to the upper corners of the panel 12, said legs lying flat and parallel against the panel 12 when the latter is in its closed position. (See Fig. 2.)

A spring catch 22 is provided in the side



wall 23 above the side panel 12 of the phonograph cabinet. The spring catch is preferably positioned in the middle of the lower edge of the side wall and consists of a knob  
5 or handle 24 actuating a spring controlled bolt 25 whose lower end normally projects below the lower edge of the wall 23 in engagement with a metal plate 26 secured to the side panel 12.

10 When it is desired to convert the side panel into an auxiliary table or stand, so that the record container will be on the top thereof, as shown in Figs. 1 and 2, the bolt 25 of the spring catch 22 is lifted by means  
15 of the knob 24 so as to allow the upper end of said side panel to be moved outwardly away from the phonograph. At the same time the legs 21 are moved outwardly, while the lower end of the side panel 12 moves vertically upwardly, the rollers 20 sliding to the upper position in the stationary grooves 19 in the front and the rear walls of the record chamber. When the rollers have reached  
20 the extreme upper ends of the grooves 19, a slight horizontal pull in the panel 12 will cause them to seat in horizontal recesses 19' extending outwardly from the grooves 19. The spring catch 22 will engage a metal thimble 27 arranged in the lower inner end  
25 of the panel 12 and thus securely lock the panel in its horizontal position. The disk records will now be adjacent to the sound reproducing mechanism of the phonograph and convenient for handling them. When  
30 it is desired to move the panel 12 into normal closing position, the spring catch 22 is raised and the panel 12 is moved slightly toward the cabinet and allowed to slide into position. When the panel is in its vertical  
35 closed position, the spring catch 22 will engage the metal plate 26 thus securely locking it in place.

40 While I have shown the preferred construction as now known to me, it will be obvious that changes may be made in the details of construction and arrangement without departing from the spirit of my invention as defined in the appended claims.

I claim:

1. In a phonograph cabinet having side walls with vertical grooves, the combination of a record chamber comprising a slidable panel, lateral pins at the lower corners thereof adapted to slide in said grooves, a pair of legs hinged to the upper corners of said  
55 panel, a record container mounted on the inner face of said panel, and means for locking said panel in closed and open positions.

2. A phonograph cabinet having side walls with vertical grooves, the combination  
60 of a record chamber comprising a slidable panel, lateral pins at the lower corners thereof adapted to slide in said grooves, a pair of legs hinged to the upper corners of said panel and adapted when the record  
65 chamber is closed, to lie flat and parallel against said side walls, a record container provided with a plurality of parallel slots mounted on the inner face of said panel, and means for automatically locking said panel  
70 in closed and open positions.

3. In a phonograph cabinet having side walls, the combination of a record chamber comprising a slidable panel, means at the lower corners thereof in permanent connection with said side walls and adapted to move vertically along said side walls, a pair of legs hinged to the upper corners of said  
75 panel, a record container mounted on the inner face of said panel, and means for  
80 locking said panel in open position.

4. In a phonograph cabinet having side walls, the combination of a record chamber comprising a vertical panel, means mounted thereon in permanent connection with said  
85 side walls and vertically movable thereon, a pair of legs hinged to the upper corners of said panel, and a record container mounted on the inner face of said panel, whereby, when said panel is moved into open position,  
90 said container will be on the upper face of said panel.

In testimony whereof I have signed my name to this specification.

STEPHEN L. HARTMAN.

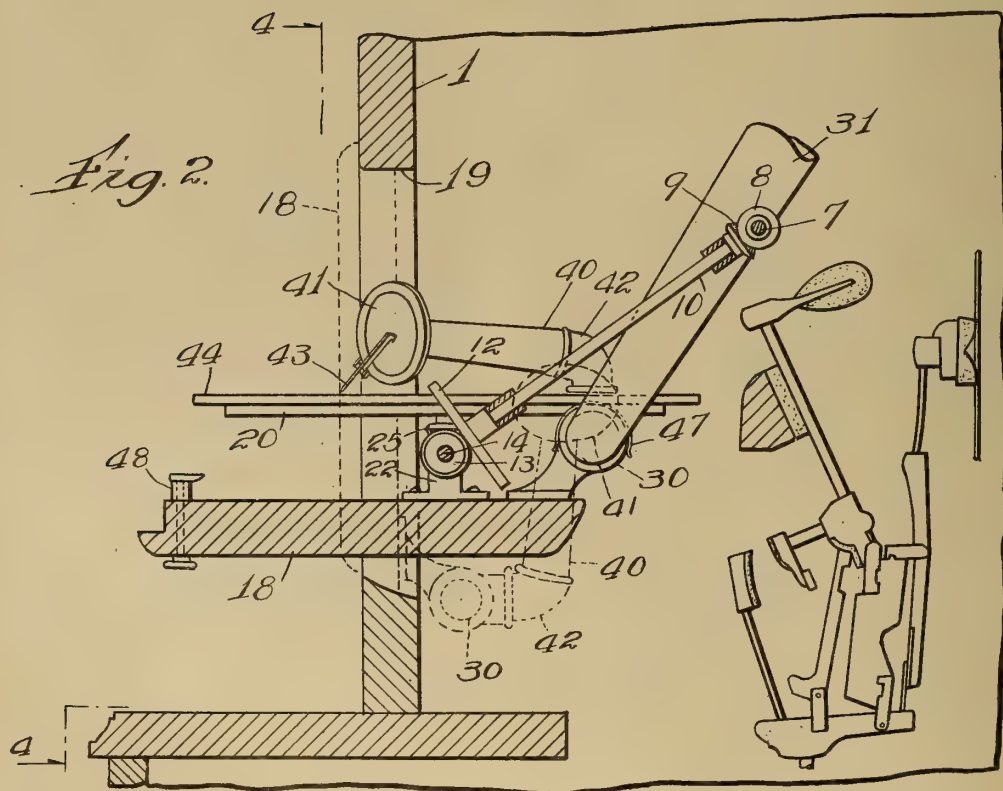
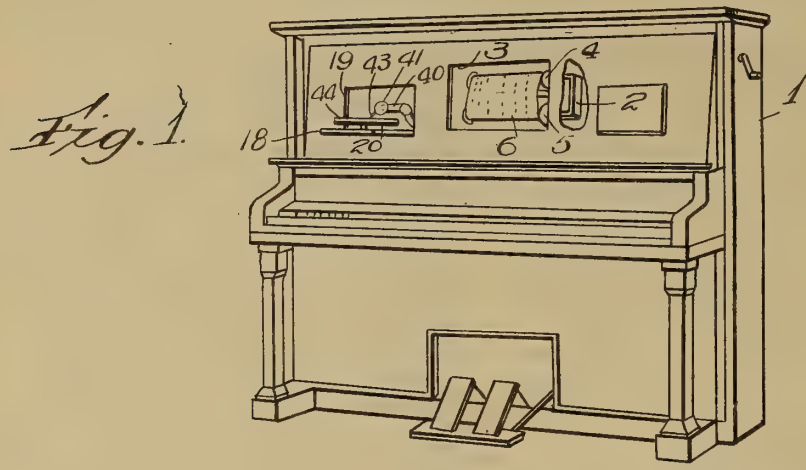


COMBINED PIANO AND PHONOGRAPH,  
#1,227,579-----C. S. Burton,  
Patented-May 29th, 1917.  
Filed-November 13th, 1916.

C. S. BURTON.  
 COMBINED PIANO AND PHONOGRAPH.  
 APPLICATION FILED NOV. 13, 1916.

1,227,579.

Patented May 29, 1917.  
 2 SHEETS—SHEET 1.



*Witness*  
*Chas. S. Burton*

*Inventor:*  
*Charles S. Burton.*  
*By* *Burton & Burton*  
*his Attys.*



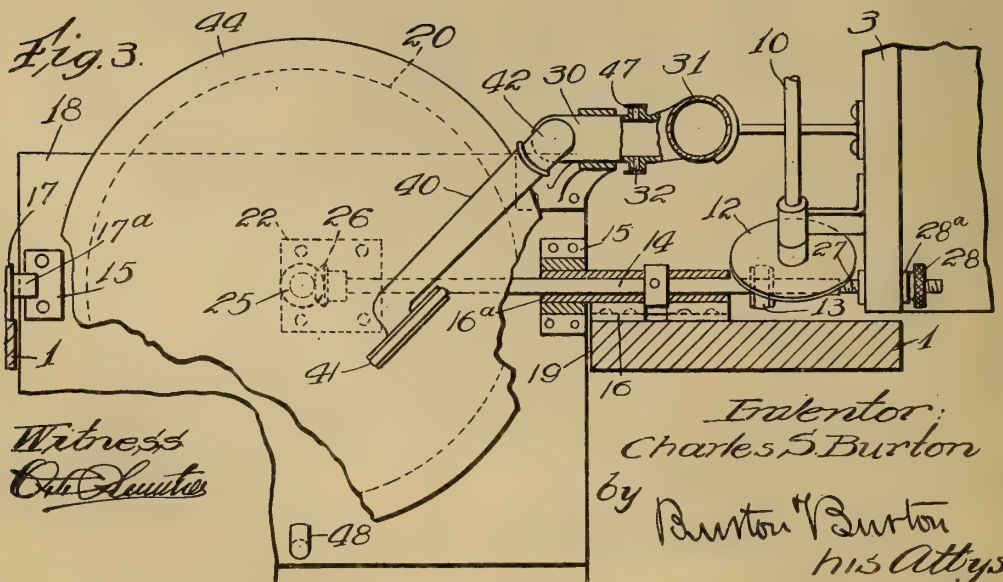
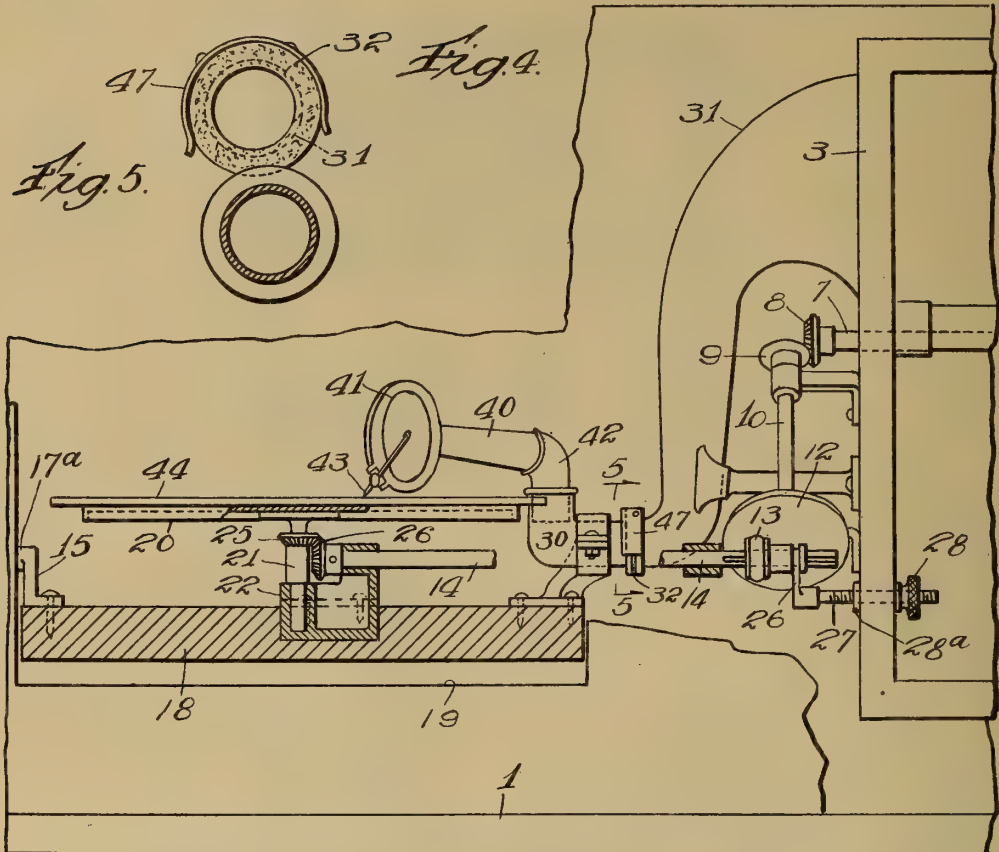


C. S. BURTON.  
COMBINED PIANO AND PHONOGRAPH.  
APPLICATION FILED NOV. 13, 1916.

1,227,579.

Patented May 29, 1917.

2 SHEETS—SHEET 2.



# UNITED STATES PATENT OFFICE.

CHARLES S. BURTON, OF OAK PARK, ILLINOIS, ASSIGNOR TO MELVILLE CLARK PIANO COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

## COMBINED PIANO AND PHONOGRAPH.

1,227,579.

Specification of Letters Patent.

Patented May 29, 1917.

Application filed November 13, 1916. Serial No. 131,035.

*To all whom it may concern:*

Be it known that I, CHARLES S. BURTON, a citizen of the United States, residing at Oak Park, in the county of Cook and State of Illinois, have invented new and useful Improvements in Combined Pianos and Phonographs, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

The purpose of this invention is to provide an improved construction for embodying within the case of a piano a complete phonograph, or sound-reproducing device of that general character, the specific purpose of the invention being to adapt the phonograph to be completely inclosed within the piano case of ordinary dimensions in front of the hammer action, and to accommodate in working position a record of the largest size commonly used, notwithstanding the diameter of such record exceeds the distance from the vertical plane of the hammers to the inner surface of the forward side of the case. It consists in the elements and features of construction shown and described as indicated in the claims.

In the drawings:

Figure 1 is a perspective view of a player piano equipped with this invention.

Fig. 2 is a vertical fore-and-aft section axial with respect to the record carrier of the phonograph, showing a portion of the piano casing and of the hammer action in its customary relation thereto, the phonograph mechanism being shown at position for playing.

Fig. 3 is a partly sectional plan view with the parts in the position of Fig. 2.

Fig. 4 is a vertical section at the line, 4—4, on Fig. 2.

Fig. 5 is a detail at the line, 5—5, on Fig. 4, showing the sound conduit in a position approaching the horn for engagement thereupon.

In the drawings, the piano case, 1, may be understood as containing customary forms of automatic playing mechanism, comprising a motor conventionally represented at, 2, the tracker and note sheet roll carrying box, 3, with the rolls, 4 and 5, and the note sheet, 6, therein. The phonograph contained in the piano case at the left hand side of the tracker box, that is, at the opposite from that at which the motor is shown,

is to be understood as actuated by the motor which operates the automatic playing mechanism of the piano, that is, it drives the rolls, 4 and 5, for propelling the note sheet, 6; and a shaft, 7, which is shown as extending back of the tracker box from the right hand side thereof to the left hand side, is to be understood as being operatively connected at the right hand end with the motor which drives the take-up and rewind rolls of the player mechanism, said motor and the connection with this shaft for driving the shaft not being shown, any suitable motor and any suitable gear connection of its train with said shaft being employed for the purpose. At the left hand end of the tracker box the shaft, 7, has a bevel gear, 8, which meshes with the bevel gear, 9, on a shaft, 10, which has journal bearings mounted on the left hand end of the tracker box, and at its forward end has a friction disk, 12, which drives a friction pulley, 13, on the shaft, 14, which is the phonograph mechanism driving shaft. The phonograph mechanism is mounted on a tilting door, 18, which closes an aperture, 19, in the forward side of the piano case when the phonograph is not in service. This door is mounted for swinging about a horizontal axis extending longitudinally of the piano case for opening and closing the door, being for this purpose pivoted about the axis of the shaft, 14, by means of brackets, 15, 15, one at each end of the said door, the one at the right hand end obtaining a pivot bearing on a sleeve, 16<sup>a</sup>, extended from the bearing of the shaft, 14, on a bracket, 16, which is mounted on the inner side of the front wall of the case, and the bracket, 15, on the left hand end of the door being similarly pivoted on a gudgeon or pintle, 17<sup>a</sup>, provided upon a bracket, 17, which is mounted upon the piano case. The record carrier, 20, mounted upon a spindle, 21, is supported for rotation by its spindle journaled and stepped in a bearing post, 22, mounted rigidly upon the door, 18, upon the inner side thereof. The spindle has rigid with it a bevel pinion, 25, and said post, 22 affords a journal bearing for the left hand end of the shaft, 14, on which there is a bevel pinion, 26, meshing with the bevel pinion, 25. On said shaft, 14, the friction pulley, 13, is mounted slidably for rotation therewith, its periph-



ery engaging frictionally the under face of the disk, 12, for deriving therefrom rotation which is transmitted through the pinions, 25 and 26, to the record carrier, 20.

5 The pulley, 13, on the shaft, 14, has a grooved hub which is engaged by a forked arm, 26, of an adjusting device, 27, which has a threaded stem engaged by a sleeve, 28<sup>a</sup>, journaled in the left hand end of the  
10 tracker box, and having a knurled head, 28, for rotating it to adjust the friction pulley, 13, radially of the disk, 12, for varying the speed of the record carrier.

Upon the inner side of the door, 18, there  
15 is mounted rigidly a sound conduit, 30, one end of which opens upward vertically at the horizontal position of the door, that is, at the operative position of the phonograph, and at this position the other end registers  
20 with the smaller end of the horn, 31, which is mounted upon the tracker box and has its larger end opening into the latter through the back thereof for delivery of the sound through the tracker box past the rolls and  
25 note sheet therein. The two abutting ends of the sound conduit, 30, and horn, 31, are each flanged and the surface of the flanges are faced with felt, 32, such faces being in a plane at right angles to the pivotal axis  
30 of the door, 18, so that the flange terminal of the sound conduit, 30, swings up alongside of and into registration with that of the horn, 31, when the door carrying the phonograph mechanism swings from closed or  
35 vertical position to operative or horizontal position. The tone arm, 40, having the sound box, 41, at its free end, is pivoted at the opposite end to one end of an elbow, 42, whose vertical limb is swiveled in the upper  
40 open end of the sound conduit, 30, for swinging to carry the tone arm and sound box horizontally when the device is in operative position for coöperation of the stylus, 43, on the sound box with the record,  
45 44, on the record carrier.

Any convenient means may be employed for locking the door, 18, at operative position of the phonograph and also at closed position of the door. A convenient expedient for the first purpose is to provide a  
50 spring clasp, 47, on the flange of the horn into which the flange of the sound conduit enters in swinging to the registered position of the two flanges, that is, of the sound conduit and the horn, that position being the open position of the door and the operative position of the phonograph. The clasp being only stiff enough to hold the parts engaged against the pull of the weight of the  
55 door and mechanism carried by it, is however adapted to yield for disengagement upon a moderate push upon the door for swinging it to closed position. A turn-button, 48, having its knob on the outer side of  
60 the door will serve to engage it for locking

it closed, and also as a handle to swing it to open position.

I claim:—

1. In combination with a musical instrument case having an aperture in the forward wall, a support pivoted to the case for swinging in a vertical fore-and-aft plane from an upstanding toward a horizontal position protruding out through said aperture; a phonograph mechanism mounted on the support at the side thereof which is innermost at the upstanding position of the support and adapted to protrude out through said aperture in the approach of the support to horizontal position.

2. In combination with a musical instrument case having an aperture in the forward wall, a support pivoted to the case for swinging in a vertical fore-and-aft plane from an upstanding toward a horizontal position protruding out through said aperture; a phonograph mechanism mounted on the support at the side thereof which is innermost at the upstanding position of the support and adapted to protrude out through said aperture when the support approaches horizontal position; a horn mounted on the support in communication with the phonograph sound-reproducing devices, the exit end of said sound conduit being positioned for registering with the intake of the horn at the substantially horizontal position of the support, said horn intake and sound conduit exit being relatively formed and positioned for withdrawal of the sound conduit exit from the horn intake in the swinging of the support toward its upstanding position.

3. In combination with a musical instrument case having an aperture in its forward wall, a support pivoted to the case for swinging in a vertical fore-and-aft plane from an upstanding toward a horizontal position protruding out through said aperture; a phonograph mechanism mounted on the support at the side thereof which is innermost at the upstanding position of the support and adapted to protrude out through the aperture when the support approaches horizontal position; a horn mounted at a fixed position within the case, having its intake mouth opening in a vertical fore-and-aft plane at right angles to the pivotal axis of the support; a sound conduit mounted on said support in communication with the sound-reproducing devices of the phonograph, having its exit or discharge mouth in the same plane as the intake of the horn, and positioned for registration with said intake at the position of maximum protrusion of the support.

4. In combination with a player piano having a case, an automatic playing mechanism mounted therein, said case having an aperture in its forward wall; a support piv-



oted to the case for swinging in a vertical fore-and-aft plane from an upstanding to a position protruding out through said aperture; a phonograph mechanism mounted  
 5 on the support at the side thereof which is innermost at the upstanding position of the support, said mechanism comprising a prime actuating shaft whose axis is coincident with the pivotal axis of the support, and operating  
 10 connections from the motor of the automatic playing devices for driving said shaft.

5. In combination with a piano having a case and automatic playing devices in said case comprising a motor for operating the  
 15 playing devices, said case having an aperture in its forward wall; a support pivoted to the case for swinging in a vertical fore-and-aft plane from an upstanding position  
 20 to a fore-and-aft extending position protruding out through said aperture; a phonograph mechanism mounted on the support at the side thereof which is innermost at the upstanding position of the support adapted  
 25 to protrude out through said aperture at the fore-and-aft extending position of the support; said mechanism comprising a drive shaft whose axis is coincident with the pivotal axis of the support, and driving connec-

tions to said shaft from the motor of the automatic playing mechanism; a horn  
 30 mounted fixedly within the piano case, the phonograph comprising a sound conduit mounted fixedly on said support and having its exit end positioned for registering with  
 35 the intake of the horn at the fore-and-aft extending position of the support.

6. In combination with a musical instrument case having an aperture in its forward wall; a support pivoted to the case for swinging in  
 40 a vertical fore-and-aft plane from an upstanding to a fore-and-aft extending position protruding out through said aperture; a phonograph mechanism mounted on the support at the side thereof which is innermost  
 45 at the upstanding position of the support and adapted to protrude out through the aperture at the fore-and-aft extending position of the support; the pivotal axis of the support being positioned with respect to said  
 50 aperture to adapt the support to constitute a closure for the aperture at the upstanding position of the support.

In testimony whereof I have hereunto set my hand at Chicago, Illinois, this 6th day of November, 1916.

CHARLES S. BURTON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

The first part of the book is devoted to a general survey of the history of the world, from the beginning of time to the present day. The author discusses the various stages of human civilization, from the earliest times to the modern era. He traces the development of the human mind, from the simple instincts of the primitive man to the complex reasoning of the modern philosopher. He also examines the progress of the human race, from the dark ages of ignorance to the bright dawn of knowledge. The author's treatment is comprehensive and thorough, covering all the major events and figures of world history. He provides a clear and concise summary of the human story, from the beginning to the end.

The second part of the book is devoted to a detailed study of the human mind. The author explores the various faculties of the mind, such as the senses, the imagination, and the reason. He discusses the nature of thought and the process of learning. He also examines the different schools of philosophy and the various theories of the mind. The author's treatment is thorough and complete, covering all the major aspects of the human mind. He provides a clear and concise summary of the human mind, from the beginning to the end.

Shaving Machine for Sound Record  
Tablets.

#1,227,748-----F.L.Capps & J.J.Scully,  
Patented-May 29th,1917.  
Filed-October 14th,1915.

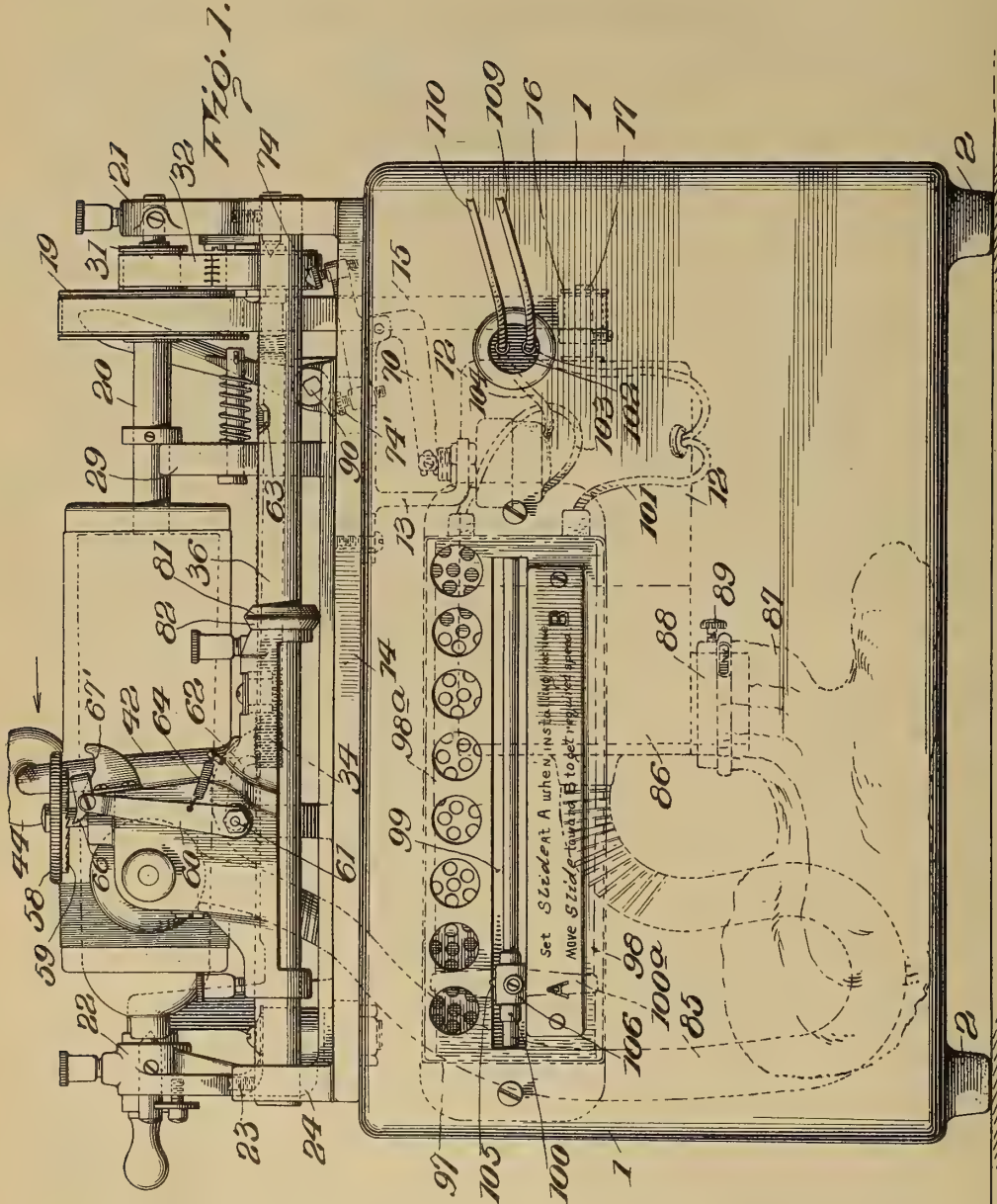


F. L. CAPPS & J. J. SCULLY.  
SHAVING MACHINE FOR SOUND RECORD TABLETS.  
APPLICATION FILED OCT. 14, 1915.

1,227,748.

Patented May 29, 1917.

9 SHEETS—SHEET 1.



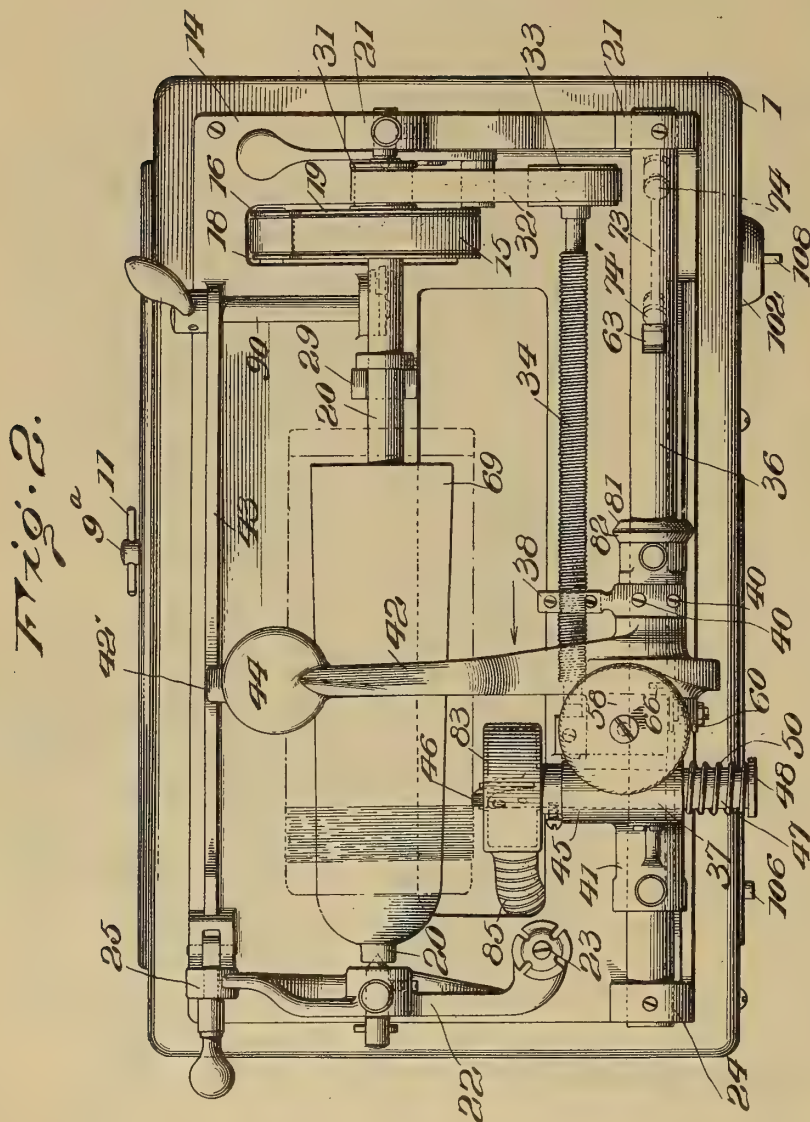
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9 SHEETS—SHEET 2.



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9 SHEETS—SHEET 3.

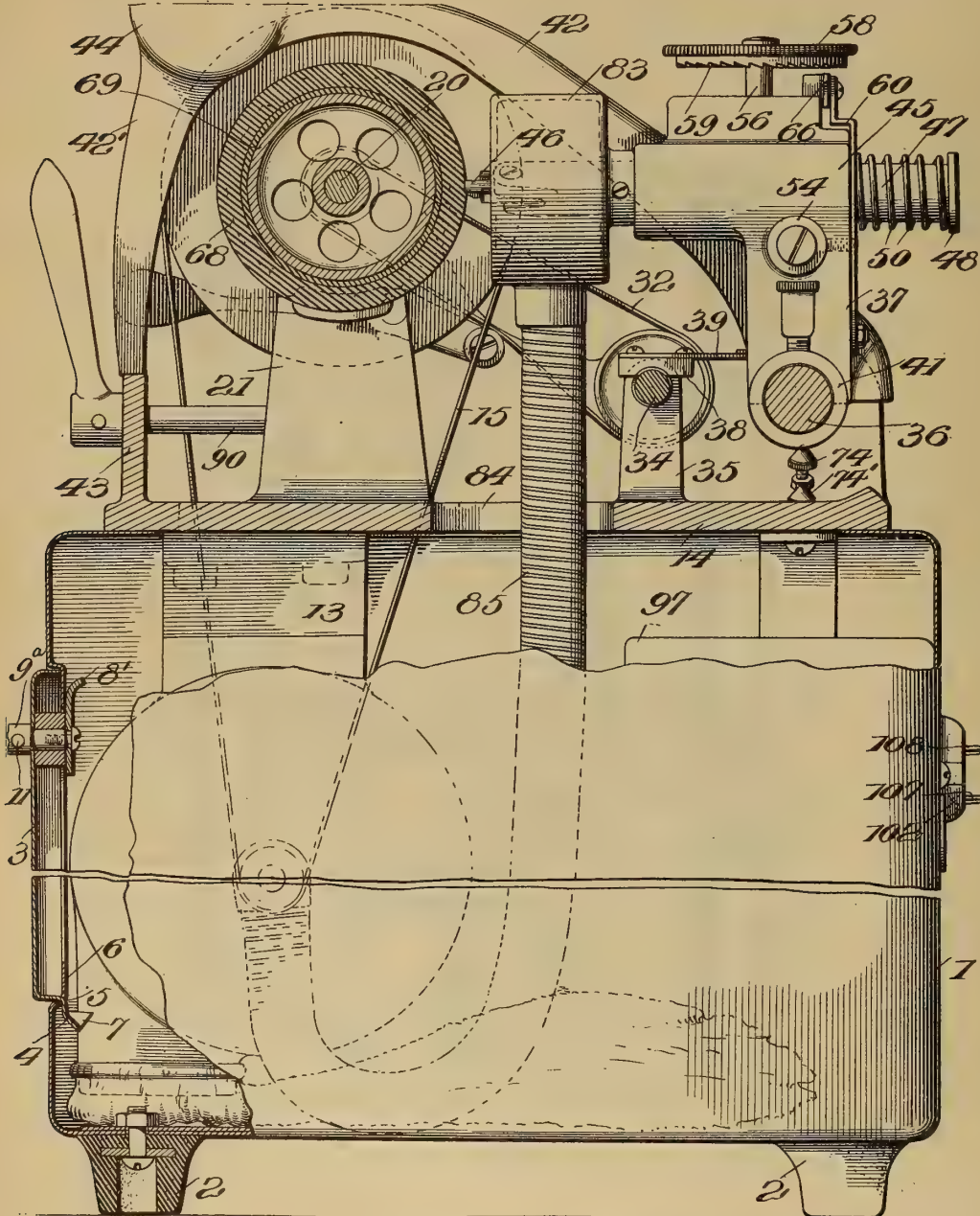


Fig. 3. Frank L. Capps  
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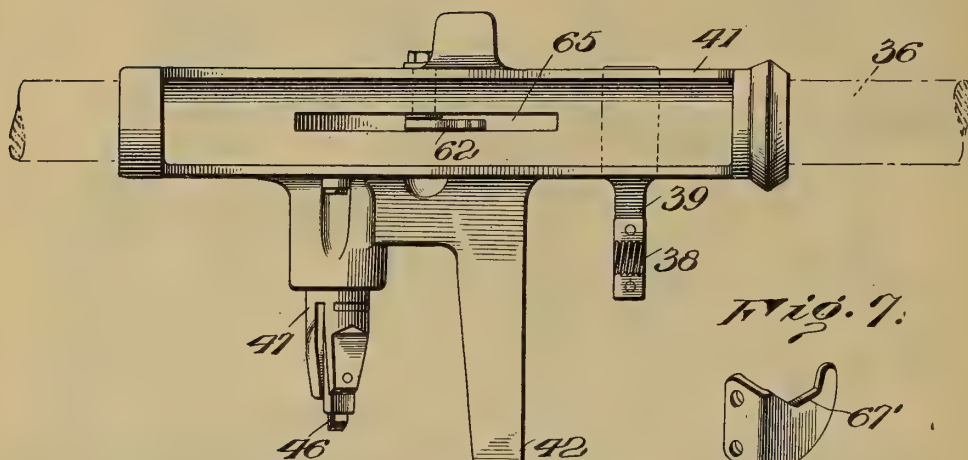


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APPLICATION FILED OCT. 14, 1915.

1,227,748.

Patented May 29, 1917.  
9 SHEETS—SHEET 4.

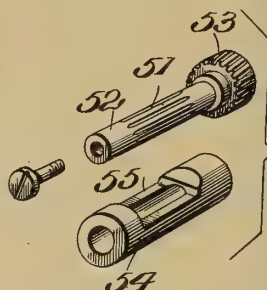
*Fig. 4.*



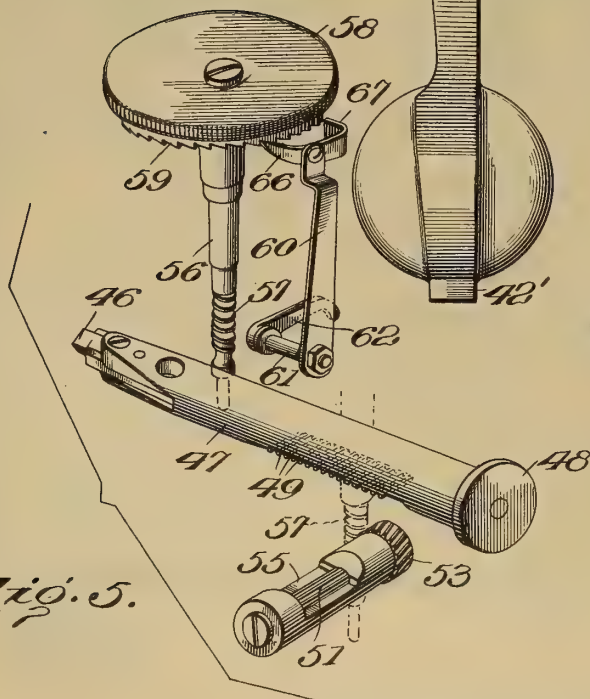
*Fig. 7.*



*Fig. 6.*



*Fig. 5.*



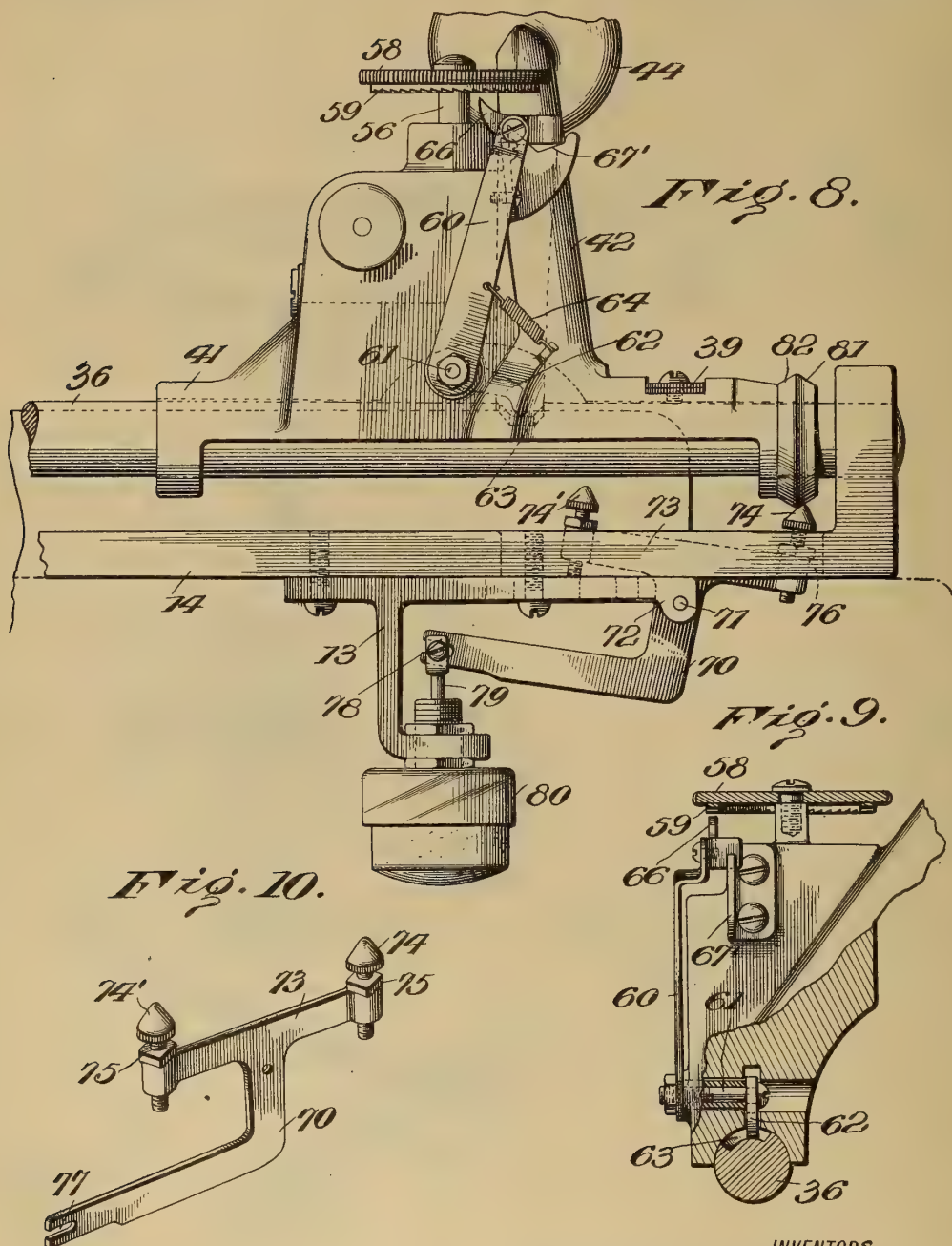
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Patented May 29, 1917.  
9 SHEETS—SHEET 5.



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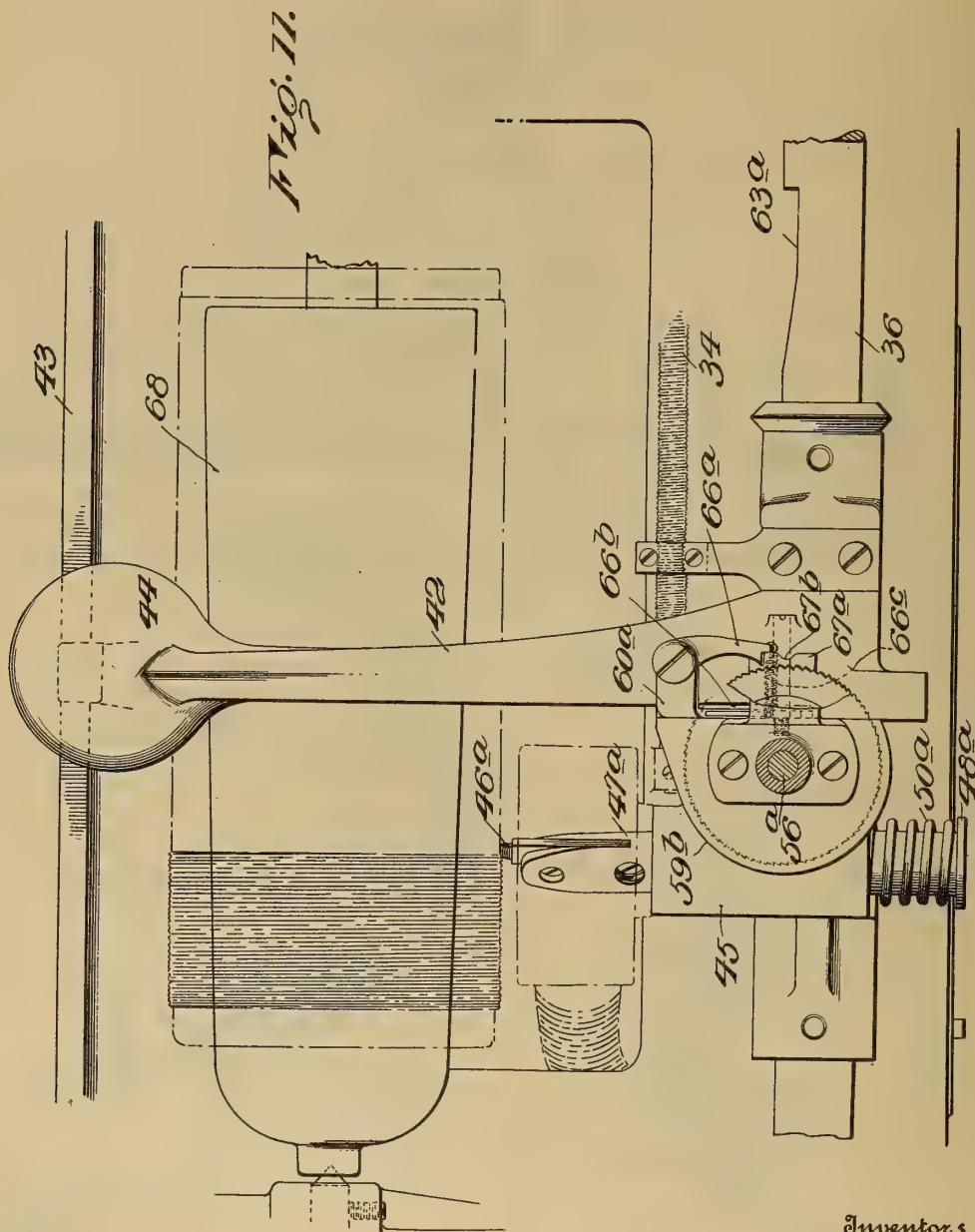




F. L. CAPPS & J. J. SCULLY.  
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1,227,748.

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9 SHEETS—SHEET 6.



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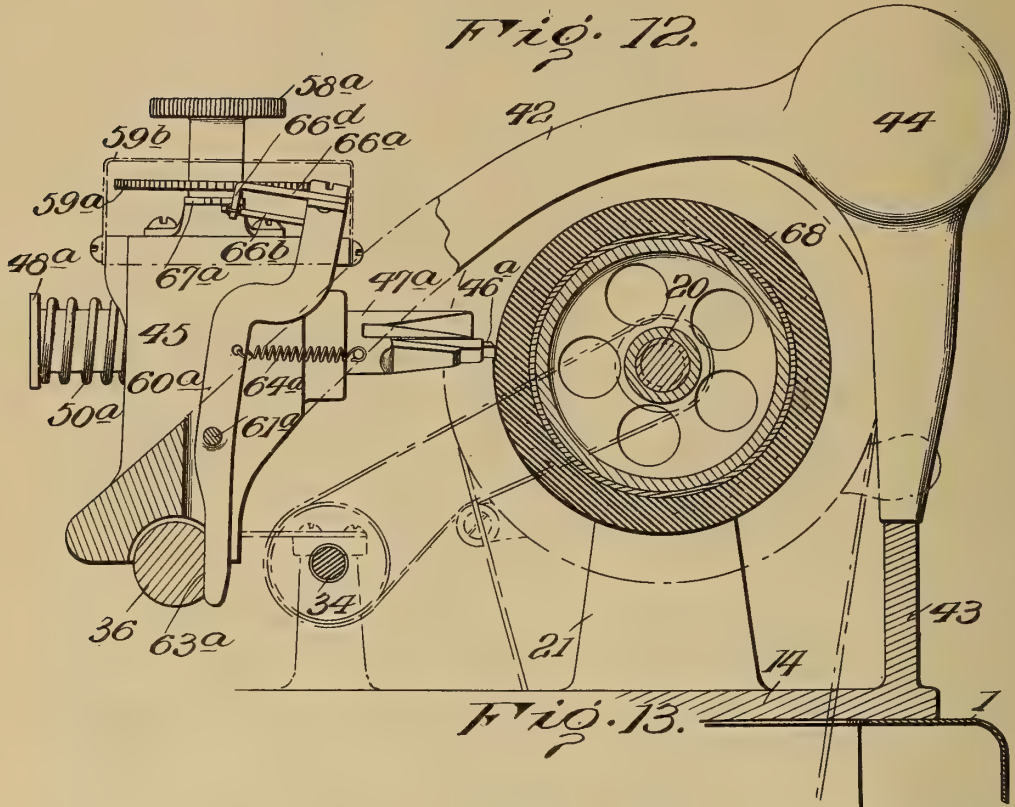




F. L. CAPPS & J. J. SCULLY.  
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APPLICATION FILED OCT. 14, 1915.

1,227,748.

Patented May 29, 1917.  
9 SHEETS—SHEET 7.



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 APPLICATION FILED OCT. 14, 1915.

1,227,748.

Patented May 29, 1917.  
 9 SHEETS—SHEET 8.

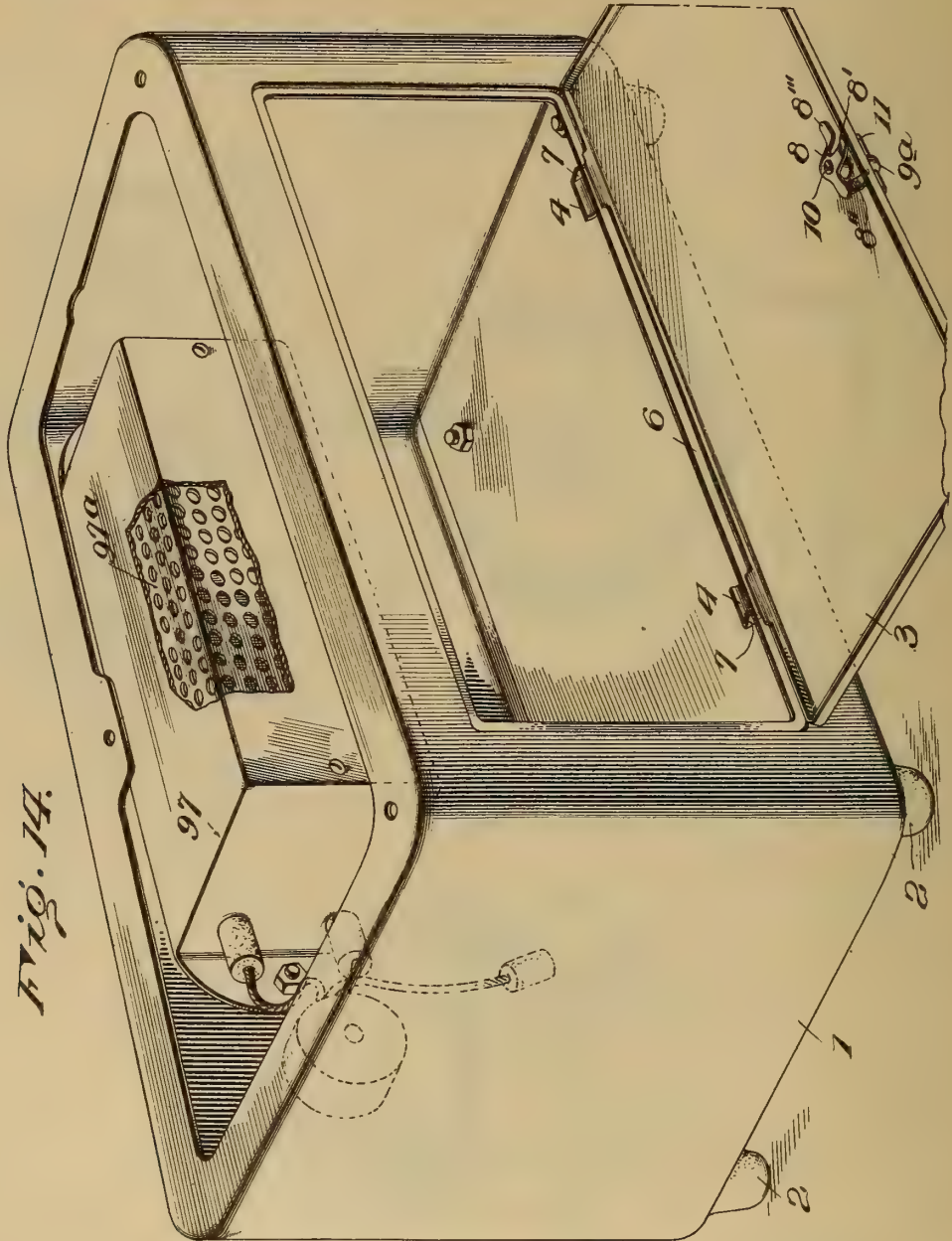


Fig. 14.



Fig. 15.

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 Lewis & Massie  
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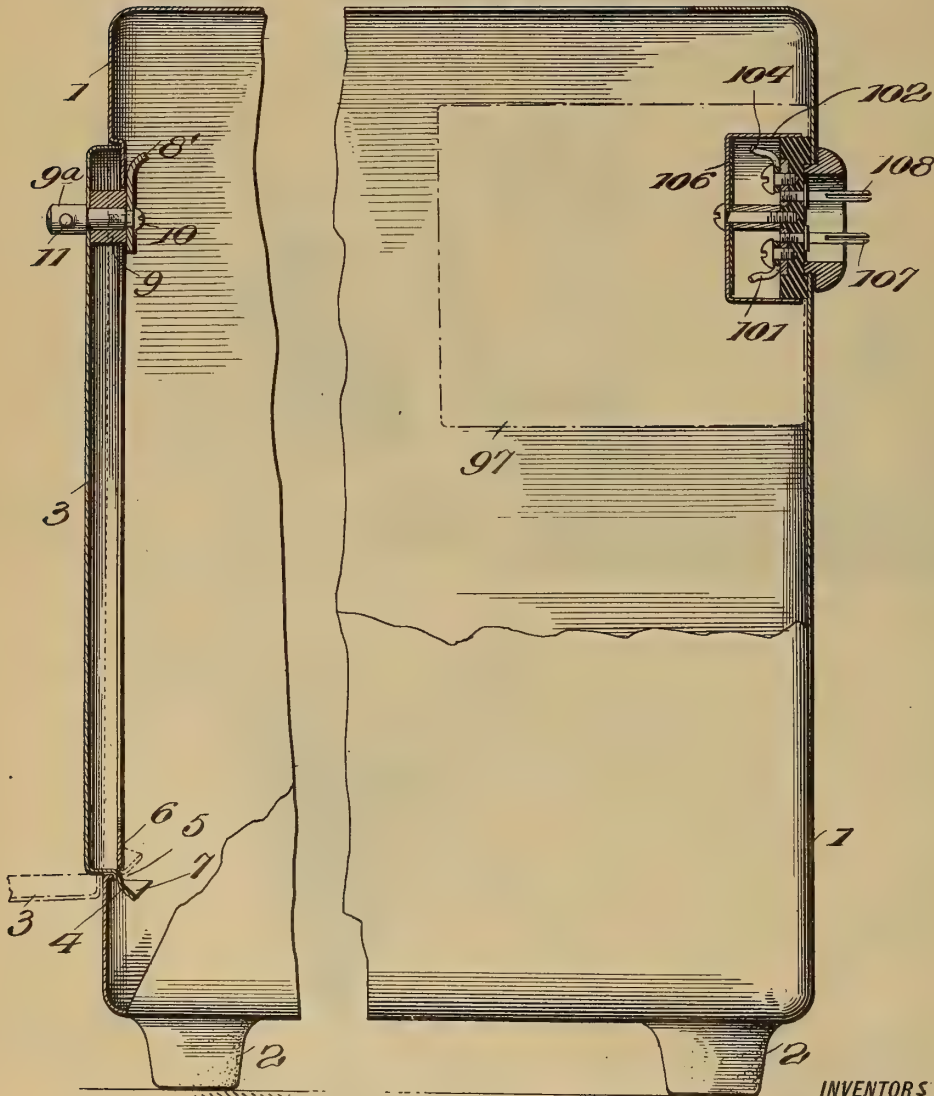
F. L. CAPPS & J. J. SCULLY.  
SHAVING MACHINE FOR SOUND RECORD TABLETS.  
APPLICATION FILED OCT. 14, 1915.

1,227.748.

Patented May 29, 1917.  
9 SHEETS—SHEET 9.

*Fig. 16.*

*Fig. 17.*



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# UNITED STATES PATENT OFFICE.

FRANK L. CAPPS AND JOHN J. SCULLY, OF BRIDGEPORT, CONNECTICUT, ASSIGNORS TO  
AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

## SHAVING-MACHINE FOR SOUND-RECORD TABLETS.

1,227,748.

Specification of Letters Patent.

Patented May 29, 1917.

Application filed October 14, 1915. Serial No. 55,913.

*To all whom it may concern:*

Be it known that we, FRANK L. CAPPS and JOHN J. SCULLY, citizens of the United States of America, and residents of Bridgeport, Connecticut, have invented a new and useful Improvement in Shaving-Machines for Sound-Record Tablets, which invention is fully set forth in the following specification.

10 This invention relates to talking machines, and more particularly to machines designed for shaving off the surfaces of record tablets used in such machines in order to present a smooth and properly prepared surface for receiving the record. The record tablets employed in talking machines used for recording sound are generally of wax or wax-like material, and the record is cut or engraved therein. It is necessary  
20 that the surface be smooth and regular. Moreover, in certain classes of machines used for dictation purposes, after the record has been dictated and transcribed, it is the common practice to shave off the record to prepare the tablet for receiving a new record thereon. The present invention is designed for use wherever it is desired to shave a tablet to prepare it for receiving a record, but more particularly it is designed for use  
30 in connection with dictaphone machines for shaving off a transcribed record and preparing the tablet for reuse as indicated above.

With this object in view, the invention  
35 consists, broadly stated, of a motor, preferably mounted in a suitable box or casing, operatively connected to a carriage moving horizontally on a suitable guide or way located above the casing, the movement of the carriage being parallel with the surface of a revolving cylindrical tablet also driven by said motor. The carriage supports a suitable shaving knife in operative relation to the surface of the record tablet, and automatic means are provided whereby the carriage, when it has reached the end of the record tablet and finished one cut, automatically shuts off the power (as an electric current) from the motor, the power being  
45 again automatically switched on as the carriage is returned to position to take a new cut; and also after the termination of a cut upon the record the knife is automatically

advanced a sufficient distance to cause it to take a new cut or shaving from the tablet. 55 The mechanism by which this advance of the knife is accomplished is also capable of manual operation, to the end that the knife may be initially adjusted to take the first cut, after which the adjustments are automatic. 60

For the purpose of removing chips or shavings and preventing the annoying accumulations thereof upon the machine and the clogging of parts of the mechanism, automatic means are provided for withdrawing shavings, as they leave the knife, by a suction device operated by the motor, the shavings being removed to a suitable closed receptacle within the motor box or casing. This receptacle may be removed 70 to empty the accumulation of shavings.

The inventive idea involved is capable of receiving a variety of mechanical expressions, two of which, for the purpose of illustrating the invention, are shown in the accompanying drawings, but it is to be expressly understood that such drawings are for the purpose of illustration only and are not designed to define the limitations of the invention, reference being had to the appended claims for this purpose. 80

In said drawings,

Figure 1 is a rear elevation of a shaving machine embodying the invention;

Fig. 2 is a top plan view thereof; 85

Fig. 3 is an end elevation, parts being shown in section;

Fig. 4 is a bottom plan view of the carriage;

Fig. 5 is a perspective view of the shaving knife and parts operatively connected therewith to automatically operate the same, the parts being shown separated or drawn apart to facilitate clear illustration;

Fig. 6 is a perspective view of the pinion which acts to advance the knife, together with the sleeve or bearing therefor; 95

Fig. 7 is a perspective view of a cam forming one of the detailed parts of the actuating mechanism for the knife; 100

Fig. 8 is a front elevation of the carriage and the switch mechanism controlling the motor;

Fig. 9 is a sectional view showing the means for actuating the pawl for advancing the knife; 105



Fig. 10 is a detail perspective of the switch lever;

Fig. 11 is a fragmentary plan view of another embodiment of the invention, the view showing the shaving knife and the parts operatively connected therewith to operate the same;

Fig. 12 is an end view, partly in section, of the parts shown in Fig. 11;

Fig. 13 is a perspective view of some of the parts shown in Figs. 11 and 12, these being shown separated or drawn apart to facilitate clear illustration;

Fig. 14 is a perspective view of the motor receiving box or casing with the side door thereof open and the box or casing inclosing the resistance device in position;

Fig. 15 is a detail perspective of the catch for the door to the motor casing;

Fig. 16 is a broken sectional detail showing the door of the box or casing closed; and

Fig. 17 is a sectional detail showing some of the electrical connections.

Referring to the drawings, in which like reference numerals indicate like parts throughout the several views, 1 indicates a suitable box or casing preferably mounted upon suitable buffer feet or supports 2 and provided with a door 3 preferably hinged at its bottom edge to an opening in the side of the casing.

Preferably the casing and door are composed of sheet metal, and the door is hinged to the casing through the medium of a plurality of ears or tongues 4 projecting from the lower edge of the door through suitable slots 5 (see Fig. 16) formed in an inwardly extending flange portion 6 in the wall of the casing, the ears 4 having an upturned triangularly shaped lobe 7 which acts as a stop to limit the opening movement of the door, preferably to a horizontal position. The door is retained in closed position by means of a catch 8 (Figs. 14, 15 and 16), consisting of a piece of spring metal, shaped as shown in Fig. 15, having a tongue 8' which engages the downwardly extended rabbeted flange on the casing when the door is closed and the latch is in engaging position. For the purpose of exerting spring tension upon the catch to hold the door snugly closed, the catch 8 has spring arms 8'' and 8''' reacting against the inner face of the door 3. The catch 8 is secured to the inner face of the door by means of a sleeve 9 and a pin 9<sup>a</sup> extending through the door, through the sleeve and through a central opening in the catch, the parts being bound together by a screw 10, as will be readily seen from an inspection of Figs. 14 and 16. The part 9<sup>a</sup> is provided with any suitable means, such as a transverse bar 11, by means of which the catch may be turned to engage and disengage the flange.

As is common with machines of the class to which this invention relates, there is mounted within the casing 1 a suitable motor 12, preferably an electric motor, shown in dotted lines in Fig. 1, the same being supported on a bracket 13 bolted to a plate 14 forming the top of the box or casing and also the supporting platform for the shaving machine proper. A suitable driving belt or cord 15 passes over a drive pulley 16 on the motor shaft 17 and extends upward through an opening 18 (Fig. 2) in the plate 14, and passes over a driving pulley 19 on the mandrel shaft 20, which shaft has bearings in brackets 21 and 29, shown on the right hand side of Fig. 1, and on an end gate 22 pivotally supported at 23 on an upwardly extending bracket 24 at the left hand side of Fig. 1, said gate being provided with a suitable catch 25 (Fig. 2) for retaining it in its closed position. On the shaft 20, adjacent to the pulley 18, is a second pulley 31, over which passes a belt 32 said belt passing around a pulley 33 on a feed screw shaft 34, having bearings in suitable brackets 35, one of which is shown in Fig. 3 projecting upward from the plate 14. Supported in suitable brackets mounted on the opposite ends of the plate 14, and parallel with the feed screw 34, is a rod 36 forming the guide or way upon which the knife supporting carriage 37 travels, the carriage being operatively connected to the feed screw by a half-nut 38 carried on an arm 39 secured to the carriage as by screws 40—40 (Fig. 2).

The carriage is in the form of a casting having a sleeve 41 and preferably having the lower middle portion thereof cut away, and its ends embracing the guide or way 36 so that the carriage is free to move or slide upon the guide or way 36, or may be turned around the said guide or way to throw the parts into and out of operative position. Projecting from the carriage, upward and over the record tablet is a curved arm 42 having a downwardly projecting leg 42' which rests upon a longitudinally extending rail 43 on the plate 14, said arm 42 being preferably provided with an enlargement 44 to provide the necessary mass or weight to hold the knife down to its work, as will be understood from further description. Extending upward from the sleeve 41 is a portion 45 of the casting serving as the support for the knife and the automatic advancing mechanism therefor. Referring to Fig. 5, the knife 46 is preferably in the form of a sapphire blade securely mounted on one end of a bar 47 which, in accordance with my invention, is preferably cylindrical as shown and provided with a flanged head 48 on the end opposite the knife and with a rack 49 on the underside thereof. This bar 47 is mounted in a horizontal bore in



the casting 45, as will be understood by an inspection of Fig. 3, with a spring 50 reacting between the head 48 on the bar and the face of the casting 45, the spring having a tendency to withdraw or retract the bar and shaving blade from the cylinder. Mounted in a bore formed in the casting 45 immediately under the bar 47 and transversely thereof is a pinion 51 engaging the rack 49 on the bar. This pinion is preferably formed integrally with a shaft 52, and has a worm gear 53 on one end thereof and preferably also integral therewith. The shaft 51 passes through a bearing sleeve 54 located in the transverse bore within the casting 45, which sleeve has its upper portion cut away, as at 55 (Figs. 5 and 6), so as to permit the upper portion of the pinion 51 to engage the rack 49 on the bar 47.

Mounted in bearings in the casting 45 is a vertical shaft 56 having formed on its lower end a worm 57, (Fig. 6), engaging the worm gear 53 on the shaft 52. This shaft 56 has secured on its upper end a disk 58 having a ratchet 59 on the under side of the periphery thereof. The disk 58 is preferably burred or knurled on its periphery to facilitate turning the same by hand, and it will be readily understood that, by turning the disk 58 in one direction, the pinion 51 will be caused to advance the knife to the left, and by turning it in the other direction, it will withdraw the knife to the right, by which means the position of the knife with relation to the surface of the record-tablet may be initially adjusted.

For the purpose of effecting the automatic advancement of the knife at the close of one cut, into position to take the next succeeding cut on the tablet, means are provided for imparting a step-by-step turning movement to the disk 58 at the end of each cut. As shown in Figs. 1 to 9, the said means consist of a lever 60 rigidly secured at its lower end to a rock-shaft 61 mounted to rock in bearings on the carriage, extending transversely to the guide or way 36 and just above the same. Rigidly secured to the opposite end of the shaft 61 from the lever 60 is an arm or lever 62, having a downwardly extending end or nose riding upon the upper surface of the guide or way 36 during the shaving operation. Located in the upper surface of said guide or way is a depression 63 (Figs. 1, 2 and 9) into which the nose of the lever 62 falls when the knife has reached the extreme end of the cut, this action being insured by a suitable spring 64 secured to the lever 60 at one end and to the casting of the carriage at the other end. To facilitate the entrance and exit of the nose of the lever 62 into the depression 63, the end walls of said depression are preferably formed on an incline or cam, as will

be readily understood from an inspection of Fig. 1. Referring to Fig. 1, it will be seen that the lever 60 is rocked to the right when the nose of the lever 62 enters the depression 63 and is rocked to the left when said lever is withdrawn from said depression. For the purpose of enabling the nose of the lever 62 to contact with the upper surface of the guide or way 36, a slot 65 (see Fig. 4) is formed in the sleeve through which slot the lever 62 extends into contact with the guide or way 36.

Pivotally mounted upon the upper end of the lever 60 is a pawl 66 whose opposite end 67 serves as a weight tending to throw the pawl 66 into engagement with the ratchet 59 on the disk 58, and yet yielding when the lever 60 is thrown to the right, so as to permit the pawl to ride over the ratchet teeth while incidentally throwing the nose of the lever into engagement with said ratchet teeth, as will be readily understood. When the nose of the lever 62 falls into the depression 63, the lever 60 is thrown to the right and the pawl 66 is withdrawn to the right to engage another tooth of the ratchet 59, and when the carriage is advanced from right to left, the lever 60 is likewise rocked from right to left, imparting a slight turning movement to the shaft 56 and thereby slightly advancing the knife 46 just sufficient to position it for taking another thin shaving from the surface of the record tablet 68 mounted on the mandrel 69. For the purpose of elevating the weighted end 67 and depressing the pawl 66, when the lever 60 moves from left to right, a cam surface 67' (Figs. 7 and 8) is arranged in the path of the weighted end 67, this cam surface being here shown as formed on a bracket arm secured to the casting of the carriage. When the lever 60 moves from right to left, the weighted end 67 descends along the surface of the cam 67' and the nose of the pawl 66 is again thrown into operative engagement with the ratchet 59. Continued movement of the lever in the same direction again causes the weighted end of the pawl to be raised and the nose of the pawl to be disengaged from the ratchet teeth. With this construction, the pawl is disengaged from the teeth at the ends of its path of reciprocation, thus making it possible for the wheel 58 to be freely turned manually in either direction.

In Figs. 11, 12 and 13, we have shown another form of the mechanism for adjusting the knife, this form being, in fact, preferable in many cases.

The knife 46<sup>a</sup> is carried by a bar 47<sup>a</sup> provided with a rack 49<sup>a</sup> on its lower side. A spring 50<sup>a</sup> reacts against a head 48<sup>a</sup> on the bar and against the casting 45 in which the bar is mounted and serves to press the bar outwardly, thus normally tending to with-



draw the knife from the record. The rack 49<sup>a</sup> is engaged by a pinion 51<sup>a</sup> on a shaft 52<sup>a</sup> carrying a worm-gear 53<sup>a</sup>. The worm-gear meshes with a worm 57<sup>a</sup> on a vertical shaft 56<sup>a</sup>. All of the parts last above described are similar to those previously described, and are similarly mounted in the casting 45.

At the upper end of the vertical shaft 56<sup>a</sup> is a hand-wheel 58<sup>a</sup>, by means of which the shaft can be manually turned at will to adjust the knife by means of the gearing that has been described. The shaft 56<sup>a</sup> carries a series of ratchet teeth which are preferably formed on a wheel 59<sup>a</sup> secured to the shaft below the said hand-wheel 58<sup>a</sup>.

Mounted on the casting 45 is a lever 60<sup>a</sup> pivoted between its ends for movement about an axis at 61<sup>a</sup> which is parallel to the guide 36. Vertically pivoted to the upper end of the lever 60<sup>a</sup> is a pawl 66<sup>a</sup> having a pointed end adapted to engage the ratchet teeth on the wheel 59<sup>a</sup>. As clearly shown in Fig. 12, lever 60<sup>a</sup> carries a pin or bar 66<sup>b</sup>, and a coiled tension spring 66<sup>c</sup> connects the free end of this pin or bar with a depending finger 66<sup>d</sup> on the pawl, thus tending to hold the pawl in engagement with the ratchet teeth. It will be seen that, when the lever is oscillated about its pivot, the pawl will engage the ratchet teeth and turn the wheel 59<sup>a</sup> to effect the adjustment of the knife. A spring 64<sup>a</sup> serves to automatically retract the lever to move the pawl in its inoperative direction.

The guide 36 is provided near one end with a notch 63<sup>a</sup>, the bottom of the notch extending entirely across the guide, as clearly shown in Figs. 11 and 12. The notch varies in depth at one end, its bottom being inclined outward to the periphery of the guide to form a cam surface.

When the carriage is moved along the guide by the mechanism that has been described, the lower end of the lever 60<sup>a</sup> is forced into the notch 63<sup>a</sup> by means of the spring 64<sup>a</sup>. Fig. 12 clearly shows the lever with its lower end in the notch. The notch is so positioned that the lever will reach the deepest part thereof at or near the completion of the cut on the record. It will be seen that movement of the carriage in the reverse direction toward the initial end of the record will cause the lever to engage the cam surface of the notch and be forced outward, its upper end carrying the pawl in the direction to turn the wheel 59<sup>a</sup>. However, as had already been stated, the carriage is not moved directly back along the guide, but is first swung about the guide to a greater or less extent. From Fig. 12, it will be obvious that this upward swinging of the carriage is equally effective to swing the lever. When the carriage is swung upward, the shoulder at the upper edge of the

notch will engage the lever and move it outward to a greater or less extent, depending upon the extent of upward swing of the carriage. It is therefore clear that any movement of the carriage out of the position which it has at the end of the cut will swing the lever to advance the knife. In order that the shaft 56<sup>a</sup> may be normally free for manual turning, we preferably provide a cam 67<sup>a</sup> adjacent the pawl and adapted to engage the aforesaid finger 66<sup>d</sup> on the pawl. The cam 67<sup>a</sup> is provided with a notch 67<sup>b</sup> and, when the pawl is reciprocated, the spring 66<sup>c</sup> moves the finger into the notch. From Fig. 11, it will be clear that the cam holds the pawl out of engagement with the ratchet teeth at the ends of its path of reciprocation and that, at the center of its path, when the finger is in the notch, the pawl engages the teeth to turn the wheel. With the lower end of the lever 60<sup>a</sup> engaging the periphery of the guide, or fully entered into the notch, the ratchet teeth will be disengaged by the pawl and manual adjustment by means of the wheel 58<sup>a</sup> can be effected. Thus the knife may be manually adjusted to a position for taking off of the tablet a first rough-cut, whereupon, by movement of the carriage to initial position, the knife will be automatically advanced a slight distance sufficient to take the final finishing cut.

Preferably, as shown in Figs. 11 and 12, a guard 59<sup>b</sup> is mounted on the carriage to partly inclose the wheel carrying the teeth 59<sup>a</sup>. The shaft 56<sup>a</sup> extends through an aperture in the top of the guard, and the hand-wheel 58<sup>a</sup> is mounted above the guard.

Means is provided for automatically stopping the operation of the mandrel and of the carriage-moving means at the end of each cut, and for starting the operation when the carriage is returned to position for taking another cut. Preferably, the parts are stopped by stopping the driving motor, and, when the motor is an electric motor as here shown and described, it is stopped by opening a suitable switch.

Referring to Figs. 1, 8 and 10, 70 is a bent lever pivoted at 71 in downwardly depending ears 72 on the bracket 13, which lever has a T-bar 73 on its upper end. At each end of the T-bar are mounted upwardly projecting conical cam surfaces 74—74', preferably formed on the heads of pins which are adjustably mounted in the T-bar by being screw-threaded therein and provided with lock nuts 75—75 for securing them in adjusted position. This T-bar 73 is located in a slot 76 in the plate 14, and at the extreme right hand end thereof. On the other arm of the lever 70 there is formed a slot 77 (Fig. 10) which engages a pin 78 on the plunger 79 of a suitable switch 80 carried by the bracket 13. When the



plunger 79 is raised, the switch is opened and when the plunger 79 is depressed, the switch is closed.

Formed on the right hand end of the carriage sleeve 41 is a pair of reversely inclined annular cam surfaces 81 and 82, and the cones 74—74' are in a position to be engaged by the cam surfaces 81 and 82 during the sliding movement of the carriage. As the carriage reaches a position near its right hand limit of travel, the cam 81 engages the cone 74 and rocks the lever 70 into the position shown in Fig. 8, thereby opening the switch and stopping the motor. When the carriage is returned to the left to take a new cut, the cam surface 82 engages the other cone 74' and rocks the lever 70 into position shown in Fig. 1, thereby closing the switch and starting the motor. It will be clear that the operation of the switch does not limit or interfere with the movement of the carriage in either direction. The carriage after engaging one of the cones is free to continue its movement under the force of the inertia of the motor and other rotating parts.

For the purpose of automatically removing the chips or shavings, a suction box 83 (Fig. 3) is mounted adjacent to the knife with an open face toward the tablet, and extending downward through an opening 84 in the plate 14 is a flexible tube 85, leading from the box 83 to a fan 86 (Fig. 1) which withdraws the shavings from the end of the tube and deposits them in a receptacle, here shown in the form of a bag 87, which is preferably porous and is removably secured to the bottom of the fan as by means of a clamping ring 88 and a set-screw 89.

For the purpose of removing the shaved tablet from the mandrel, a suitable tablet ejector mechanism 90 is provided, which serves to loosen the tablet from the mandrel and, the gate 22 being open, the tablet is then removed by hand. This ejector mechanism of itself constitutes no part of this invention, and will not be described in detail.

Referring to Fig. 14, 97 is a box or casing mounted on the interior of the main frame or casing 1 and inclosing the means employed for controlling the resistance for the current flowing to the motor. This casing is also shown in dotted lines in Figs. 1 and 17. Inside the casing 97 is an inclosure 97<sup>a</sup>, preferably made of sheet metal and perforated as shown in Figs. 1 and 14. Inside the inclosure 97<sup>a</sup> are two parallel horizontal resistance coils 98 and 98<sup>a</sup>, connected respectively to the wires 101 and 103. Between the coils in the back wall of the casing 1 is a slot 99 (Fig. 1). Slidably mounted in the slot 99 is a member 100 which carries a connecting clip 100<sup>a</sup> slidably engaging and electrically connected to the two

coils. The clip 100<sup>a</sup> is electrically insulated from the carrier member 100. The wires 101 and 103, together with other suitable wires, such as 104, connect the coils with the socket 102, the motor 12 and the switch 80. By adjusting the sliding member 100 in the slot 99, the clip 100<sup>a</sup> may be moved along the coils and the resistance may be increased or decreased at will, thereby varying the speed of the motor, and consequently the speed at which the record tablet is driven. Preferably a pointer 105 is associated with the sliding member 100, which member is manipulated by means of a hand-hold 106 of electrical insulating material. A suitable scale may be, and preferably is, associated with the pointer 105 whereby the desired speed may be indicated.

The socket 102 for the electrical connections may be of any suitable form and, as here shown, it consists of two binding posts for the wires 101 and 104 suitably inclosed in a casing 106, which binding posts are in electrical connection with the circuit plugs 107 and 108, respectively, for reception of the sockets on the usual plug carrying the main current wires 109 and 110.

While the construction of the device has been herein described with considerable detail and particularity, it will be understood that the invention is not limited to the specific and detailed construction thus described; and, furthermore, it will be understood that certain parts or sub-combinations of the mechanism may be employed in the absence of other parts or combinations. All such variations from the specific construction shown and described, and such sub-combinations, are within the purview of the invention, the limits of which are to be determined by the appended claims rather than by the specific construction herein set forth.

What is claimed is:—

1. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a carriage movable along a tablet on the mandrel from one end to the other, a knife on the carriage, and knife-advancing means automatically operable on the termination of each cut by a longitudinal movement of the carriage.

2. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a carriage movable along a tablet on the mandrel and capable of being lifted away therefrom, a knife on the carriage, and knife-advancing means automatically operable by a lifting movement of the carriage.

3. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a carriage movable along a tablet on the mandrel and capable of being lifted



away therefrom, a knife on the carriage, and knife-advancing means automatically operable by a lifting movement of the carriage or by a longitudinal movement thereof.

5 4. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a carriage, a guide or way for said carriage on which the carriage is capable of both longitudinal movement and turning  
10 movement, a knife supported on the carriage, mechanism for adjusting the knife with relation to a tablet on the mandrel, and means operable on the termination of each cut to actuate said mechanism when  
15 the carriage is turned about said guide or way.

5 5. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a carriage, a guide or way for said carriage on which the carriage is capable of both longitudinal movement and turning  
20 movement, a knife supported on the carriage, mechanism for adjusting the knife with relation to a tablet on the mandrel, and means operable on the termination of each cut to actuate said mechanism upon longitudinal movement of the carriage on said  
25 guide or way.

30 6. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a carriage, a guide or way for said carriage on which the carriage is capable of both longitudinal movement and turning movement, a knife supported on the carriage,  
35 mechanism for adjusting the knife with relation to a tablet on the mandrel, and means operable on the termination of each cut to actuate said mechanism upon longitudinal movement of the carriage on said guide or way or upon turning movement of the carriage on said guide or way.

7. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a carriage movable along a tablet  
45 on the mandrel, a knife movably mounted on the carriage, and worm-gear mechanism mounted on the carriage and connected with the knife for moving the latter toward or from the tablet.

50 8. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a carriage movable along a tablet on the mandrel, a knife movably mounted on the carriage, and mechanism mounted on  
55 the carriage and connected with the knife for moving the latter toward or from the tablet, the said mechanism comprising a rack rigidly connected to the knife, a rotatable pinion engaging the rack, and means  
60 for turning the pinion.

9. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a carriage movable along a tablet on the mandrel, a knife movably mounted  
65 on the carriage, and mechanism mounted on

the carriage and connected with the knife for moving the latter toward or from the record, the said mechanism comprising a rack rigidly connected to the knife, a rotatable pinion engaging the rack, a worm-wheel rotatable with the pinion, a worm engaging the worm-wheel, and a device for turning the worm. 70

10. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a carriage movable along the tablet on the mandrel, a knife movably mounted on the carriage, and mechanism mounted on the carriage and connected with the knife for moving the latter toward or from the tablet, the said mechanism comprising a rack rigidly connected to the knife, a rotatable pinion engaging the rack and means automatically operable by movement of the carriage for turning said pinion. 75 85

11. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a carriage movable along the tablet on the mandrel, a knife movably mounted on the carriage, and mechanism  
90 mounted on the carriage and connected with the knife for moving the latter toward or from the record, the said mechanism comprising a rack rigidly connected to the knife, a rotatable pinion engaging the rack, a worm-wheel rotatable with the pinion, a worm engaging the worm-wheel and means automatically operable by movement of the carriage for turning said worm. 95

12. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a carriage movable along a tablet on the mandrel, a knife mounted on the carriage, mechanism comprising a manually operable rotatable shaft for adjusting the knife with relation to the tablet, worm-gear mechanism for rotating said shaft and means automatically operable by a movement of the carriage for actuating said worm-gear mechanism. 100 105 110

13. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a carriage, a guide or way for said carriage, a knife supported on the carriage, and a lever fulcrumed on the carriage and operatively connected to said knife, one arm of said lever being in a position to operatively contact with lever operating depression in said guide or way to rock the lever upon movement of the carriage after completion of each cut. 115 120

14. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a carriage movable along a tablet on the mandrel, a knife mounted on the carriage, mechanism comprising worm-gear mechanism for adjusting the knife with relation to the tablet, a rotatable wheel for actuating said worm-gear mechanism, ratchet teeth on the wheel, a reciprocating 125 130



pawl adapted to engage the teeth to turn the wheel, and a pawl-actuating device automatically operable by a movement of the carriage.

15 15. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a carriage movable along a tablet on the mandrel, a guide or way for said carriage, a knife mounted on the carriage, mechanism comprising a rotatable wheel for adjusting the knife with relation to the tablet, ratchet teeth on the wheel, a reciprocating pawl adapted to engage the teeth to turn the wheel, and a pawl-actuating device co-acting with camming means on said guide or way and automatically operable by a movement of the carriage.

20 16. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a carriage movable along a tablet on the mandrel, a knife on the carriage, mechanism comprising a rotatable shaft for adjusting the knife with relation to the tablet, ratchet teeth carried by the shaft, a reciprocating pawl adapted to engage the teeth to turn the shaft, a pawl-actuating device automatically operable by a movement of the carriage, and means for normally holding the pawl out of engagement with the teeth, thereby leaving the shaft free to be turned manually in either direction.

25 17. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a carriage movable along a tablet on the mandrel, a knife on the carriage, mechanism comprising a rotatable shaft for adjusting the knife with relation to the tablet, ratchet teeth carried by the shaft, a reciprocating pawl adapted to engage the teeth to turn the shaft, a pawl-actuating device automatically operable by a movement of the carriage, and means for holding the pawl out of engagement with the teeth when at the end of its path of reciprocation, thereby leaving the shaft free to be turned manually in either direction.

30 18. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a carriage movable along a tablet on the mandrel, a knife on the carriage, mechanism comprising a rotatable shaft for adjusting the knife with relation to the tablet, ratchet teeth carried by the shaft, a reciprocating pawl adapted to engage the teeth to turn the shaft, a pawl-actuating device automatically operable by a movement of the carriage, and a cam in the path of the pawl permitting it to engage the teeth during the central part of its path of reciprocation and forcing it out of engagement therewith at the ends of its path of reciprocation, thereby leaving the shaft free to be turned manually in either direction.

35 19. In a machine for shaving sound-record

tablets, the combination of a tablet-carrying mandrel, a carriage movable along a tablet on the mandrel, a knife movably mounted on the carriage, and mechanism for automatically moving the knife relatively to the carriage toward the tablet comprising a lever pivoted on the carriage about an axis substantially parallel to the mandrel and an abutment fixed against movement with the carriage.

70 20. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a carriage movable along a tablet on the mandrel, a knife movably mounted on the carriage, and mechanism for automatically moving the knife relatively to the carriage toward the tablet comprising a lever pivoted on the carriage about an axis substantially parallel to the mandrel and a cam fixed against movement with the carriage.

75 21. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a carriage movable along a tablet on the mandrel, a knife movably mounted on the carriage, a mechanism for moving the knife relatively to the carriage toward the tablet comprising a rotatable shaft on the carriage, ratchet teeth carried by the shaft, a reciprocating pawl adapted to engage the teeth to turn the shaft, a pawl-actuating lever pivoted on the carriage about an axis substantially parallel to the mandrel, and a fixed abutment for engaging the lever.

80 22. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a knife-supporting carriage, a knife movably mounted on the carriage, a mechanism for moving the knife relatively to the carriage toward the tablet comprising a movable device on the carriage, and a guide for the carriage on which it is movable longitudinally, the said guide having a part provided with a surface adapted to engage and actuate the said movable device on the carriage when the carriage is moved.

85 23. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a knife-supporting carriage, a guide for the carriage on which it is movable longitudinally, the guide having a notch therein, a knife movably mounted on the carriage, and a mechanism for moving the knife relatively to the carriage toward the tablet comprising a device on the carriage automatically movable into the notch of the guide.

90 24. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a knife-supporting carriage, a guide for the carriage on which it is movable longitudinally, the guide having a notch therein, a knife movably mounted on

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the carriage, and a mechanism for moving the knife relatively to the carriage toward the tablet comprising a rotatable shaft on the carriage, ratchet teeth carried by the shaft, a reciprocating pawl adapted to engage the teeth to turn the wheel, and a pawl-actuating lever on the carriage having a part automatically movable into the said notch of the guide.

25. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a knife-supporting carriage, a guide for the carriage on which it is movable longitudinally, the guide having at one side a notch with one end beveled, a knife movably mounted on the carriage, and a mechanism for moving the knife relatively to the carriage toward the tablet comprising a device on the carriage automatically movable transversely into the notch of the guide and adapted to be forced outward by the beveled side of the notch when the carriage is moved, thereby moving the knife.

26. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a knife-supporting carriage, a guide for the carriage on which it is movable longitudinally, the guide having a notch therein, a knife movably mounted on the carriage, and a mechanism for moving the knife relatively to the carriage toward the tablet comprising a device on the carriage automatically movable into the notch of the guide and adapted to be forced outward when the carriage is moved longitudinally along the guide.

27. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a knife-supporting carriage, a guide for the carriage on which it is movable angularly, the guide having a notch therein, a knife movably mounted on the carriage, a mechanism for moving the knife relatively to the carriage toward the tablet comprising a device on the carriage automatically movable into the notch of the guide and adapted to be forced outward when the carriage is moved angularly on the guide.

28. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a knife-supporting carriage, a guide for the carriage on which it is movable longitudinally or angularly, the guide having a notch therein, a knife movably mounted on the carriage, and a mechanism for moving the knife relatively to the carriage toward the tablet comprising a device on the carriage automatically movable into the notch of the guide and adapted to be forced outward when the carriage is moved angularly or is moved longitudinally on the guide.

29. In a machine for shaving sound-record tablets, the combination of a tablet-

carrying mandrel, a carriage, a guide or way for said carriage on which the carriage has both longitudinal and turning movement, a cam and a shoulder on said guide or way, mechanism for advancing the knife a predetermined distance after the termination of each cut, and means operatively connected with said mechanism and engaging said cam or shoulder by a longitudinal or turning movement respectively of the carriage on said guide or way.

30. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a carriage movable along a tablet on the mandrel, a knife carried by the carriage, a suction box supported on the carriage adjacent the knife, a fan fixed against movement with the carriage, and a flexible tube connecting the suction box with the fan.

31. In a machine for shaving sound-record tablets, the combination of a supporting plate, a tablet-carrying mandrel above the plate, a carriage above the plate and movable along a tablet on the mandrel, a knife carried by the carriage, a suction box supported on the carriage adjacent the knife, a fan below the plate fixed against movement with the carriage, and a flexible tube connecting the suction box with the fan, the said plate being provided with a slot for the tube permitting the tube to move with the carriage.

32. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a carriage movable along a tablet on the mandrel, a knife carried by the carriage, a suction box supported adjacent the knife, a fan having its suction connected with the suction box, and a porous shavings receptacle connected with the discharge of the fan.

33. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a carriage movable along a tablet on the mandrel, a knife carried by the carriage, a suction box supported adjacent the knife, a fan having its suction connected with the suction box, and a porous bag connected with the discharge of the fan to receive shavings.

34. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a knife-carrying carriage movable along a tablet on the mandrel, means for moving the carriage, means for driving the mandrel and the carriage moving means, and means automatically operable by the carriage when it reaches a position near the end of the tablet for stopping the mandrel and the carriage moving means, said last-mentioned means being so constructed that the carriage may pass by its stop-operating position.

35. In a machine for shaving sound-rec-



ord tablets, the combination of a tablet-carrying mandrel, a knife-carrying carriage movable along a tablet on the mandrel, means for moving the carriage, means  
 5 for driving the mandrel and the carriage moving means, and means comprising coacting cam surfaces automatically operable by the carriage when it reaches a position near the end of the tablet for stopping the  
 10 mandrel and the carriage moving means and automatically operable by the carriage during its return to initial position for starting the mandrel and the carriage moving means.

15 36. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a knife-carrying carriage movable along a tablet on the mandrel, means for moving the carriage, means for  
 20 driving the mandrel and the carriage moving means, and means comprising coacting cam surfaces automatically operable by the carriage when it reaches a position near the end of the tablet for stopping the man-  
 25 drel and the carriage moving means.

37. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a knife-carrying carriage movable along a tablet on the mandrel,  
 30 means for moving the carriage, means for driving the mandrel and the carriage moving means, and means automatically operable by the carriage when it reaches a position near the end of the tablet for stop-  
 35 ping the mandrel and the carriage moving means and automatically operable by the carriage during its return to initial position for starting the mandrel and the carriage moving means, said means being so  
 40 constructed that the carriage may pass by its stop-actuating position.

38. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a knife-carrying carriage  
 45 movable along a tablet on the mandrel, means for moving the carriage, an electric motor for driving the mandrel and the carriage moving means, a switch in the motor circuit, and means comprising coacting cam  
 50 surfaces automatically operable by the carriage when it reaches a position near the end of the tablet for opening the switch to stop the motor.

39. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a knife-carrying carriage  
 55 movable along a tablet on the mandrel, means for moving the carriage, an electric motor for driving the mandrel and the carriage moving means, and means comprising a switch automatically operable by the carriage  
 60 when it reaches a position near the end of the tablet for stopping the motor and automatically operable by the carriage dur-

ing its return to initial position for starting 65 the motor.

40. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a knife-carrying carriage movable along a tablet on the mandrel, 70 means for moving the carriage, an electric motor for driving the mandrel and the carriage moving means, a switch in the motor circuit, means comprising a plurality of  
 75 cams operatively connected with the switch, and cams on the carriage coacting with said first-named cams whereby the switch is automatically operable by the carriage when it reaches a position near the end of the tablet for  
 80 stopping the motor and automatically operable by the carriage during its return to initial position for starting the motor.

41. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a knife-carrying carriage 85 movable along a tablet on the mandrel, means for moving the carriage, an electric motor for driving the mandrel and the carriage moving means, and means comprising a switch automatically operable by the carriage 90 when it reaches a position near the end of the tablet for stopping the motor, said means being so constructed that the carriage may pass by its switch-operating position.

42. In a machine for shaving sound-record 95 tablets, the combination of a tablet-carrying mandrel, a knife-carrying carriage movable along a tablet on the mandrel, means for moving the carriage, an electric 100 motor for driving the mandrel and the carriage moving means, a switch in the motor circuit, and means automatically operable by the carriage when it reaches a position near the end of the tablet for opening the 105 switch to stop the motor.

43. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a knife-carrying carriage, a guide for the carriage on which it is movable longitudinally and angularly, means 110 for moving the carriage along the guide, means for driving the mandrel and the carriage moving means, and means automatically operable by the carriage when it reaches a position near the end of the tablet 115 for stopping the mandrel and the carriage moving means and automatically operable by the carriage when it is returned to initial position for starting the mandrel and the carriage moving means, the said stopping 120 and starting means being operable with the carriage in any angular position.

44. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a knife-carrying carriage, 125 a guide for the carriage on which it is movable longitudinally and angularly, means for moving the carriage along the guide,



means for driving the mandrel and the carriage-moving means, and means automatically operable by the carriage when it reaches a position near the end of the tablet for stopping the mandrel and the carriage-moving means, the said stopping means being operable when the carriage is in any angular position.

45. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a knife-carrying carriage movable along a tablet on the mandrel, means for moving the carriage, means for driving the mandrel and the carriage moving means, a pivoted T-lever, a controlling means connected with the body part of the lever for stopping and starting the movement of the mandrel and the carriage moving means, and devices on the arms of the lever for engagement with the carriage to move the lever to bring the controlling means into stopping position when the carriage moves in one direction and into starting position when the carriage moves in the other direction.

46. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a knife-carrying carriage movable along a tablet on the mandrel, means for moving the carriage, means for driving the mandrel and the carriage-moving means, a pivoted lever, a controlling means connected with the body part of the lever for stopping the movement of the mandrel and the carriage-moving means, and a device on the lever having a cam surface for engagement with a cam surface on the carriage to bring the controlling means into stopping position, said lever being moved by the coaction of said cam surfaces to a position permitting the passage of the carriage by its stop-controlling position.

47. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a knife-carrying carriage, a guide for the carriage on which it is movable longitudinally and angularly, means for moving the carriage along the guide, means for driving the mandrel and the carriage moving means, a pivoted T-lever, a controlling means connected with the body part of the lever for stopping and starting the movement of the mandrel and of the carriage moving means, an abutment on the carriage concentric with the guide, and devices on the arms of the lever for engagement with the abutment irrespective of the angular position of the carriage to move the lever to bring the controlling means into stopping position when the carriage moves in one direction and into starting position when the carriage moves in the other direction.

48. In a machine for shaving sound-rec-

ord tablets, the combination of a tablet-carrying mandrel, a knife-supporting carriage movable along a tablet on the mandrel, a driving motor, a casing surrounding the motor, an electrical resistance device entirely within the casing and electrically connected with the motor, and manually operable means accessible from the exterior of the casing for adjusting the resistance device.

49. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a knife-supporting carriage movable along a tablet on the mandrel, a driving motor, a casing surrounding the motor and provided with a slot in one wall, an electrical resistance device entirely within the casing and electrically connected with the motor, and manually operable means extending through the slot of the casing and movable therein for adjusting the resistance device.

50. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a knife-supporting carriage movable along a tablet on the mandrel, a driving motor, a casing having its top open, a cover plate for the casing supporting the mandrel and the carriage on its upper side and the motor on its lower side, and an electrical resistance device positioned within the casing and supported entirely independently of the said cover plate.

51. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a knife-supporting carriage movable along a tablet on the mandrel, a driving motor, a receptacle for shavings, a sheet-metal box surrounding the motor and the shavings receptacle, the box being provided with an opening bordered by a depressed flange slotted along one edge, a sheet-metal door formed to engage the depressed flange and provided with ears extending through the slots and having bent lobes to prevent removal, and a latch for holding the door in closed position.

52. In a machine for shaving sound-record tablets, the combination of a tablet-carrying mandrel, a knife-supporting carriage movable along a tablet on the mandrel, a driving motor, a receptacle for shavings, a sheet-metal box surrounding the motor and the shavings receptacle, the box being provided with an opening bordered by a depressed flange, a sheet-metal door formed to engage the depressed flange and hinged at one edge, and a latch pivoted to the door opposite the hinged edge and formed with one finger adapted to engage the inner surface of the flange and with another finger engaging the inner surface of the door to hold the first said finger in place.

53. In a machine for shaving sound-record tablets, the combination of a tablet-car-



rying mandrel, a carriage movable along a tablet on the mandrel, a knife on the carriage, means for manually adjusting said knife to take from the tablet a first rough-cut, and means automatically operable by the restoration of the carriage to initial position for advancing said knife to take the final finishing-cut of predetermined depth.

54. In a machine for shaving sound-recording tablets, the combination of a tablet-carrying mandrel, a carriage movable along a tablet on the mandrel, a knife on the carriage, means for manually adjusting said knife to take from the tablet a first rough-cut, and means automatically operable upon completion of said first-cut and by the restoration of the carriage to initial position for advancing said knife to take the final finishing-cut of predetermined depth.

55. In a machine for shaving sound-rec-

ord tablets, the combination of a tablet-carrying mandrel, a carriage movable along a tablet on the mandrel, a guide or way for said carriage on which the carriage is capable of both longitudinal and turning movement, a knife on the carriage, means for manually adjusting said knife to take from the tablet a first rough-cut, and means automatically operable by raising the carriage upon restoring the same to initial position for advancing said knife to take the final finishing-cut of predetermined depth.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

FRANK L. CAPPS.  
JOHN J. SCULLY.

Witnesses:

LESLIE S. EASTMAN,  
J. S. GRIFFITH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



DRIVING DEVICE FOR TALKING MACHINES,  
#1,228,014-----J. Frier,  
Patented-May 29th, 1917.  
Filed-May 18th, 1916.



1,228,014.

Fig. 1.

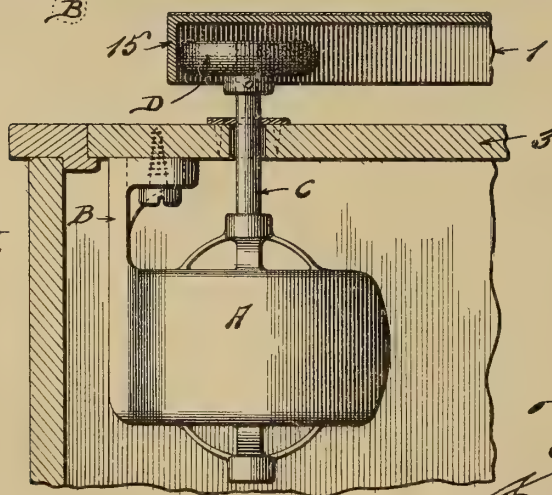
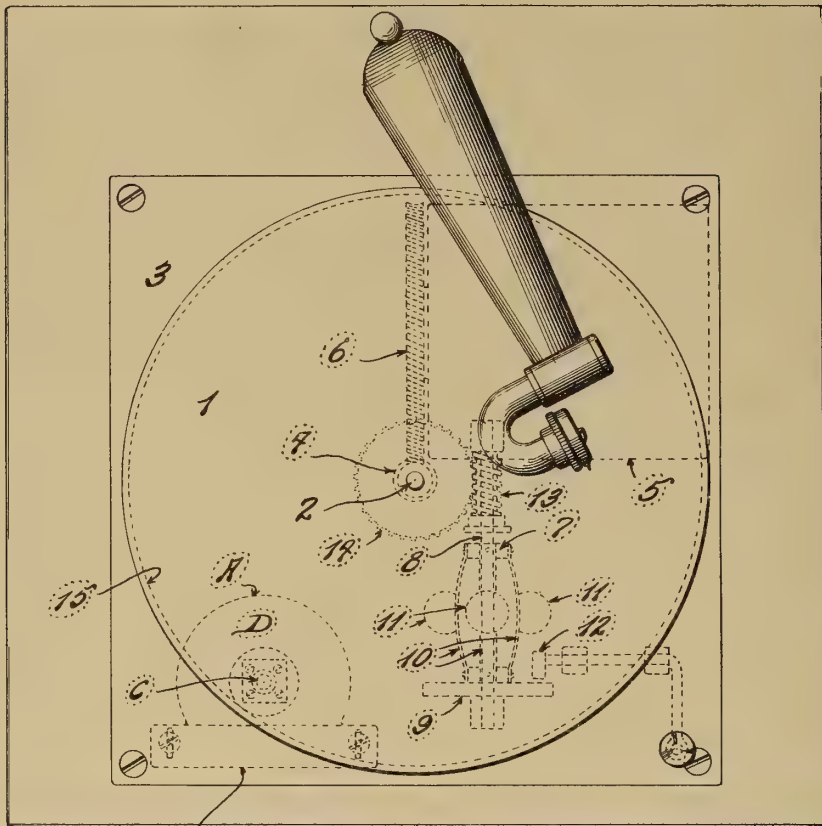


Fig. II.

INVENTOR:

JOHN FRIER,

High Hook *grays.*

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# UNITED STATES PATENT OFFICE.

JOHN FRIER, OF ST. LOUIS, MISSOURI.

DRIVING DEVICE FOR TALKING-MACHINES.

1,228,014.

Specification of Letters Patent. Patented May 29, 1917.

Application filed May 18, 1916. Serial No. 98,330.

*To all whom it may concern:*

Be it known that I, JOHN FRIER, a citizen of the United States of America, a resident of the city of St. Louis, State of Missouri, have invented certain new and useful Improvements in Driving Devices for Talking-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention relates to means for driving talking machines, one of the objects being to produce a very simple and inexpensive driving device adapted to be easily and quickly attached to an ordinary spring driven talking machine, so as to serve as a substitute for the usual spring motor. With this object in view, the attachment preferably comprises an electric motor provided with a friction drive wheel adapted to engage the turn-table, or record holder, of the machine, and to avoid unnecessary expense, the driving attachment is so constructed and arranged that the speed governor, forming part of the talking machine, will be effective when the attachment is in service. The attachment may be readily applied without moving or in any way disturbing the spring motor and other driving elements of an ordinary spring driven talking machine.

Figure I is a top or plan view of an ordinary talking machine, equipped with my driving attachment.

Fig. II is an enlarged fragmentary section illustrating the driving attachment.

1 designates a turn-table, or record holder, fitted to the usual vertical spindle 2 in any suitable manner. The spindle passes through a base plate 3 and is provided with a worm 4 near its lower end. The usual spring motor 5, arranged below the base 3, is equipped with a drive wheel 6 which meshes with the worm 4. When the spring motor is in service, the worm, spindle and turn-table revolve rapidly in response to the rotary movement of the drive wheel 6.

The speed governor comprises a collar 7 fixed to a horizontal shaft 8, a friction wheel 9 slidably fitted to said shaft, springs 10 connecting the fixed collar 7 to the slidable friction wheel 9, weights 11 secured to said spring and a friction member 12 adapted to be engaged by the friction wheel 9. The

governor is driven through the medium of a worm 13 secured to the shaft 8, and a worm wheel 14 secured to the spindle 2 and meshing with said worm 13. When the turn-table rotates at a predetermined rate of speed, the friction wheel 9 will engage the friction member 12 to prevent an increase in the speed, as is well understood in this art.

The driving attachment preferably comprises an electric motor A secured to the bracket arm B, the latter being adjustably attached to the plate 3 by means of screws which pass through slots at the upper end of the bracket.

The record turn-table 1 has the usual downturned annular flange 15 at its outer margin. A power shaft C, extending upwardly from the electric motor A, is provided at its upper end with a friction drive wheel D which engages the inner face of the downturned annular flange 15. It will be noted that the motor and its friction wheel D may be easily and quickly applied to an ordinary spring driven talking machine without in any way interfering with the ordinary driving elements of the machine. When the driving attachment is in service, movement is transmitted from the friction drive wheel B to the turn-table, through spindle 2, worm wheel 14 and worm 13 to the governor, the latter serving to regulate the speed of the machine when the driving attachment is in operation.

The friction drive wheel D is preferably provided with a yieldable peripheral portion which engages the downturned flange 15 on the turn-table, and which yields freely to compensate for inaccuracies in the construction and arrangement of the driving elements.

I claim:—

The combination, with a record turn-table having a depending annular flange and a base-plate; of a depending bracket secured to the base-plate; a motor mounted on the bracket, a vertical power-shaft on the motor, extending upwardly through the base-plate and a drive-wheel provided on the power-shaft and engaging the inner face of the depending annular flange of the record turn-table.

JOHN FRIER.



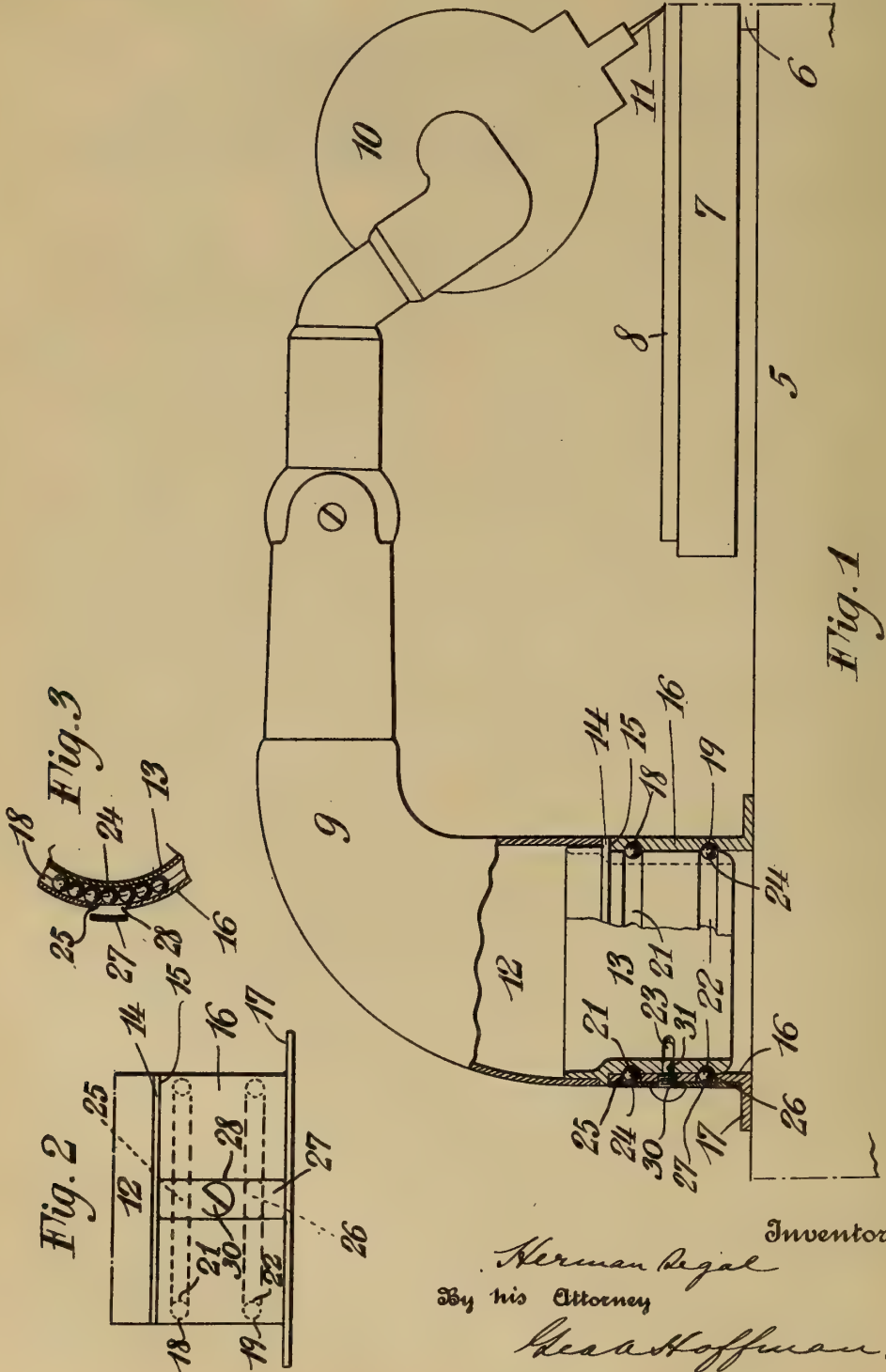


TONE ARM SUPPORT,  
#1,228,064-----H. Segal,  
Patented-May 29th, 1917.  
Filed-September 5th, 1916.

H. SEGAL.  
TONE ARM SUPPORT.  
APPLICATION FILED SEPT. 5, 1916.

1,228,064.

Patented May 29, 1917.



Inventor

*Herman Segal*

By his Attorney

*Heard Hoffman.*

# UNITED STATES PATENT OFFICE.

HERMAN SEGAL, OF NEW YORK, N. Y.

## tone-arm support.

1,228,064.

Specification of Letters Patent.

Patented May 29, 1917.

Application filed September 5, 1916. Serial No. 118,390.

*To all whom it may concern:*

Be it known that I, HERMAN SEGAL, a citizen of the United States, residing at New York, in the county of Bronx and State of New York, have invented certain new and useful Improvements in Tone-Arm Supports, of which the following is a full, clear, and exact specification.

The object of my invention is to provide an improved anti-friction mounting for the tone-arm of a talking machine adapted to be produced at a low cost, of but few parts and of simple and practical construction.

Accordingly my invention consists in the arrangement and combination of parts and elements as hereinafter described and as illustrated in the accompanying drawing in which—

Figure 1 is a view, partly in elevation and partly in section, of a tone-arm mounting embodying my invention.

Fig. 2 is a fragmentary view in elevation of the mounting, and

Fig. 3 is a partial horizontal sectional view through the upper ball race.

In the drawing the reference numeral 5 denotes the talking machine cabinet from which protrudes the turntable shaft 6 which carries the turntable 7 upon which rests a record 8. The tone-arm as a whole is indicated by the numeral 9. 10 is the sound box and 11 the needle. These parts are shown in outline only and for the sake of illustration.

The tone-arm is provided with a depending cylindrical portion 12 to which is sweated or otherwise secured a sleeve 13 having a flange 14 which acts as a stop for the tone-arm and which rests upon the shoulder 15 of the hollow bracket or neck 16 secured by any suitable means (not shown) to the cabinet 1 for which purpose the neck 16 is provided with a flange 17.

The neck or hollow bracket 16 is further provided with two outer ball races 18 and 19, while the sleeve 13 is provided with two corresponding inner ball races 21 and 22 and a slot 23. Balls 24, 24 run in the races 18—21 and 19—22.

In order to place the balls in the races, the neck 16 is provided with the openings 25 and 26 extending from the outside through the wall of the neck into the ball races. This opening 25 communicates with the upper ball race 18—21, and the opening

26 leads into the lower ball race 19—22. The openings are covered by a plate 27 which fits into a cut out portion 28 of the wall of the neck 16, the holes 25 and 26 being cut through said thinned portion, so that the plate is practically flush with the outer surface of the neck or bracket 16.

30 is a screw for securing the plate 27 in position. The shank 31 of the screw projects into the said slot 23 to limit the movement horizontally of the tone-arm as will be understood.

In assembling the tone-arm, the sleeve 13 is inserted into the bracket 16. Thereafter the balls are dropped through the openings 25 and 26 into the respective ball races. A slight turning of the bracket or tone-arm will cause the balls to run around the races and make room for the succeeding balls. After the last ball has been put in place, the plate 27 is adjusted over the openings and the screw 30 screwed home and the parts are assembled. It will also be understood that the parts are so proportioned that the plate does not bind upon the balls but that the latter are free to move in the races.

The parts are further so arranged that the weight of the tone-arm rests upon the balls and not upon the shoulder 15 of the bracket 16, though a close fit is made at the latter point for the sake of appearance and also to prevent dust from settling under the flange 14. In addition to acting as an anti-friction means for the tone-arm and to support the weight thereof, it will be noted that the balls 18 serve as a locking means which prevents the removal of the tone-arm from the bracket 16.

The mounting as here described and illustrated is very simple in construction and very efficient in operation. The mounting is anti-friction because of the balls and the latter also serve to take up any small inaccuracies in the diameters of the bracket 16 and the tone-arm sleeve 13 and support the latter in two different horizontal planes to prevent vertical oscillations, as is obvious.

Although only a single form has been illustrated herein, the invention is not limited thereto but may be varied without departing from the spirit of the invention or the scope of the appended claim.

I claim:

The combination with the tone-arm and the cabinet of a talking machine, a hollow



sleeve secured to said tone-arm and having  
a horizontal slot, a hollow bracket secured  
to said cabinet and adapted to receive said  
hollow sleeve, ball bearings between the lat-  
5 ter and the said bracket, a plate for prevent-  
ing the balls in said ball bearings from leav-

ing the same and a screw for securing the  
said plate to the said hollow bracket, said  
screw extending into the said slot to limit  
the movement of the said tone-arm.

In testimony whereof, I affix my signature.

HERMAN SEGAL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."

SOUND BOX MOUNTING FOR TALKING  
MACHINES,

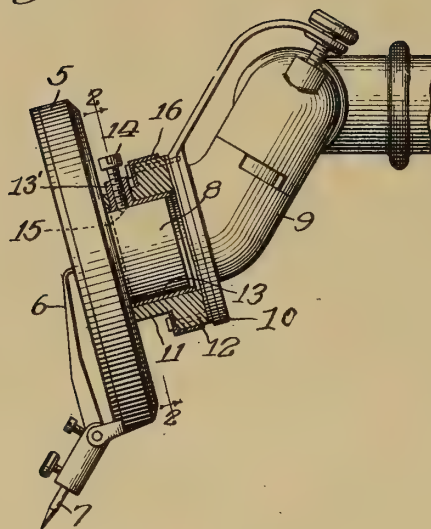
#1,228,115-----A.A.Huseby,  
Patented-May 29th, 1917.  
Filed-Nov. 27th, 1916.

A. A. HUSEBY.  
SOUND BOX MOUNTING FOR TALKING MACHINES.  
APPLICATION FILED NOV. 27, 1916.

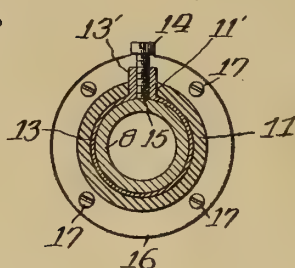
1,228,115.

Patented May 29, 1917.

*Fig. 1.*



*Fig. 2.*



*Witnesses:*

*Ed. Chavins*  
*C. H. Krosner*

*Inventor.*

*Albert A. Huseby.*

*By Bond & Wilson*

*Attys.*



# UNITED STATES PATENT OFFICE.

ALBERT A. HUSEBY, OF CHICAGO, ILLINOIS.

SOUND-BOX MOUNTING FOR TALKING-MACHINES.

1,228,115.

Specification of Letters Patent.

Patented May 29, 1917.

Application filed November 27, 1916. Serial No. 133,568.

*To all whom it may concern:*

Be it known that I, ALBERT A. HUSEBY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sound-Box Mountings for Talking-Machines, of which the following is a specification.

This invention relates to the art of talking machines, and has reference more particularly to an improved mounting of the sound box on the tone arm designed to afford a certain degree of universal flexibility between the sound box and the tone arm whereby to enable the stylus to follow the record-groove more accurately and faithfully, and prevent likelihood of the stylus jumping the groove, particularly at shallow spots in the latter.

My invention, its mode of operation, and the advantages attending the same, will be readily understood by those familiar with this art upon reference to the following detailed description, taken in connection with the accompanying drawing wherein I have illustrated a simple and practical embodiment of the invention, and wherein—

Figure 1 is an elevational view, partly in vertical section, of the sound box, the forward portion of the tone arm, and my improved coupling or connection between the two; and

Fig. 2 is a cross section on the corresponding line of Fig. 1.

Referring to the drawing, 5 designates the sound box, 6 the stylus lever, and 7 the stylus, which parts may be of any known or approved construction. On the rear side of the sound box 5 is a laterally extending shank 8 of tubular form in cross section, as clearly shown in Fig. 2. 9 designates the inner end portion of the tone arm, which is herein shown as capable of turning on its longitudinal axis through an angle of ninety degrees to accommodate the use of a convertible sound box, such as the sound box illustrated; but it should be understood that the present invention is not limited to any special construction or style of sound box. The inner end or face of the tone arm 9 is provided with an annular flange 10. 11 designates the cylindrical body portion of a universally flexible coupling-member between the shank 8 of the sound box and the end of the tone arm 9. This coupling member 11 is preferably made of rubber and is

formed with an annular flange 12 at the end thereof adjacent to the tone arm. The coupling member 11 is provided with an internal metal lining in the form of a thin sleeve 13, which has a loose sliding fit on the shank 8 of the sound box. The coupling member with its lining is detachably secured to the shank 8 by a fastening screw 14 threaded into a lug 13' on the lining sleeve 13 and engaging a notch or hole 15 in the shank 8, the lug 13' itself extending through a hole 11' in the coupling member 11. The flange 12 of the coupling member is secured to the flange 10 of the tone arm preferably by means of a ring-shaped, thin-metal clamp 16 of L-shape in cross section, which clamp fits the rear face and a portion of the peripheral edge of the flange 12, and a plurality of fastening screws 17 that are passed through the clamp 16, the flange 12, and are tapped into the flange 10 of the tone arm. It should be noted that the outer edge of the clamp ring 16 is out of contact with the flange 10, a sufficient space being left between these parts to insure the maximum flexing of the rubber coupling-member required in service.

By reason of the fact that the rubber coupling-member is secured by independent means at its opposite ends to the shank of the sound box and the face of the tone arm, respectively, said coupling member affords sufficient play to the sound box and stylus lever, independently of the play afforded by the tone arm, to insure the perfect tracking of the stylus with the groove of the record and a superior tone effect. The lining sleeve 13 is slightly shorter than the body 11 of the flexible coupling-member, so as to be out of contact at its ends with the back of the sound box and the face of the tone arm.

Without limiting myself to the precise construction and arrangement illustrated and described,—

I claim:

1. In a sound-box mounting for talking machines, the combination with a sound box having a laterally extending shank; and a tone arm formed with an annular flange, of an annular coupling member of rubber embracing said shank and formed with an annular flange, a fastening screw uniting said coupling member to said shank, a ring-shaped clamp fitting the inner face and a portion of the peripheral edge of the flange

of said coupling member, and fastening screws passing through said clamp, the flange of said coupling member, and into the flange of the tone arm.

- 5 2. In a sound-box mounting for talking machines, the combination with a sound box having a laterally extending shank, and a tone arm, of an annular coupling member of rubber, an internal lining of metal for  
10 said coupling member embracing said shank, means for securing said coupling member and its lining to said shank, and independent means for securing said coupling member to the tone arm.
- 15 3. In a sound-box mounting for talking machines, the combination with a sound box

having a laterally extending shank, and a tone arm formed with an annular flange, of an annular coupling member of rubber formed with an annular flange, an internal  
20 lining of metal for said coupling member embracing said shank, a fastening screw uniting said coupling member and its metal lining to said shank, a ring-shaped clamp fitting the inner face and a portion of the  
25 peripheral edge of the flange of said coupling member, and fastening screws passing through said clamp, the flange of said coupling member, and into the flange of the tone arm.

ALBERT A. HUSEBY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

SOUND BOX FOR TALKING MACHINES,  
#1,228,116-----A. A. Huseby,  
Patented-May 29th, 1917.  
Filed-December 22n, 1916.



A. A. HUSEBY.  
SOUND BOX FOR TALKING MACHINES.  
APPLICATION FILED DEC. 22, 1916.

1,228,116.

Patented May 29, 1917.

Fig. 1

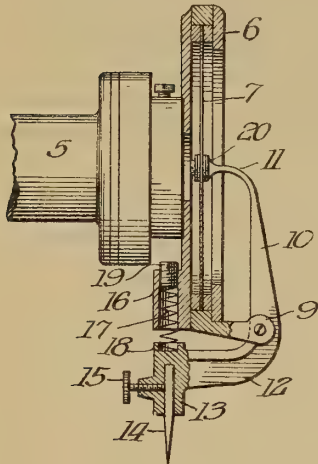


Fig. 2

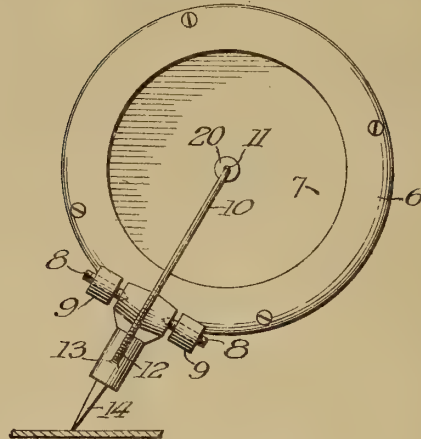


Fig. 3

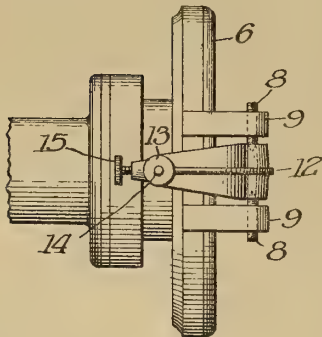


Fig. 4

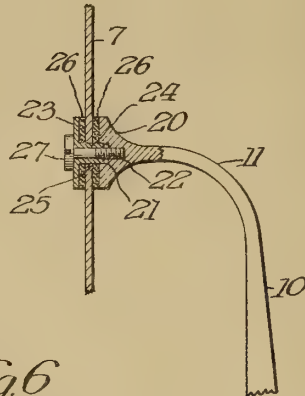


Fig. 5

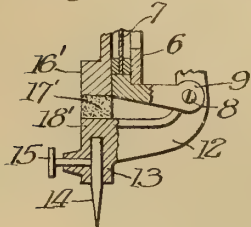
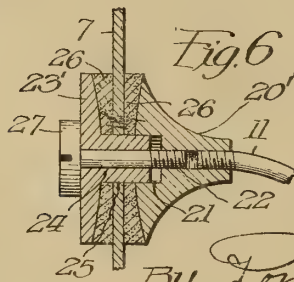


Fig. 6



Inventor  
Albert A. Huseby  
By Ford & Wilson  
Attys

# UNITED STATES PATENT OFFICE.

ALBERT A. HUSEBY, OF CHICAGO, ILLINOIS.

## SOUND-BOX FOR TALKING-MACHINES.

1,228,116.

Specification of Letters Patent.

Patented May 29, 1917.

Application filed December 22, 1916. Serial No. 138,356.

*To all whom it may concern:*

Be it known that I, ALBERT A. HUSEBY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sound-Boxes for Talking-Machines, of which the following is a specification.

This invention relates to improvements in sound boxes for talking machines. In view of the extensive use of records of both the vertically undulating and laterally undulating type, efforts have been made to produce a single sound box that should be capable of playing both kinds of records with equal efficiency, and a considerable number of such sound boxes have been proposed. So far as I am aware, however, these so-called convertible sound boxes have necessitated a change of position of the sound box relatively to the tone arm when a record of the other type is to be played, the sound box usually requiring to be shifted through an angle of ninety degrees relatively to the tone arm. Recognizing that it is desirable to produce a sound box that shall be capable of playing both types of record without necessitating any change of position relatively to the tone arm, I have had in view, as the chief object of the present invention, the designing and production of a sound box wherein the stylus lever could be vibrated equally well under either an endwise or a lateral vibration imparted to the point of the stylus by the record groove without involving any relative change of position of the sound box on the tone arm.

Another object of the invention is to provide an improved means for attaching the upper end of the stylus lever to the diaphragm of the sound box, whereby to insure a connection preventing any warping strain on the diaphragm and allowing the latter to vibrate freely and fully responsive to the vibrations of the stylus lever.

With these objects in view, my invention consists of the new and improved structural features in a talking machine sound box herein fully described and more particularly pointed out in the claims.

In order that the principle of my invention and its mode of operation may be readily understood by those familiar with this art, I have, in the accompanying drawing, illustrated one workable and practical

embodiment of the invention, and referring thereto,—

Figure 1 is a side elevation, partly in diametric section, of a sound box embodying my improvements, showing also a fragment of the usual swiveled elbow section of the tone arm to which the sound box is connected.

Fig. 2 is a front elevation of the sound box shown in Fig. 1.

Fig. 3 is a substantially bottom plan view, looking at the point of the stylus as seen in Fig. 2.

Fig. 4 is a detail view in section through the diaphragm and the upper portion of the stylus lever, showing my improved means of connecting the stylus lever to the diaphragm.

Fig. 5 is a fragmentary sectional view, illustrating a modified form of the means for transmitting the weight of the sound box to the stylus without strain on the diaphragm.

Fig. 6 is a view similar to Fig. 4, illustrating a detachable stylus lever head and a modification of the means for attaching the same to the diaphragm.

Referring to the drawings, 5 designates the outer end portion of the usual swiveled elbow section of the tone arm, and 6 designates as an entirety the sound box carrying the usual diaphragm 7. Pivotally mounted on pins 8 between a pair of forwardly extending lugs 9 on the lower edge of the sound box is the stylus lever. This latter includes an upper arm 10 that extends substantially parallel with and radially of the diaphragm 7 and has an inwardly turned upper end portion 11 that is connected to the diaphragm centrally of the latter by the means hereinafter described. 12 designates the lower arm of the stylus lever that extends downwardly and inwardly beneath the sound box 6 and is provided on its free end with a transversely disposed socket piece 13 carrying the stylus 14 secured therein by the usual set screw 15. On the back side of the sound box 6 is formed a hollow lug 16 that constitutes a housing for a compression spring 17, the lower end of which latter is stepped in a shallow pocket 18 formed in the upper end of the socket piece 13. The upper end of the spring 17 abuts against a screw-threaded plug 19, which latter forms a means for adjusting the force of the spring 17. It will be readily understood that the



purpose of the spring 17 is to provide an elastic or yielding support for the sound box on the stylus-carrying end of the stylus lever, to transmit a portion of the weight of the sound box through the free end of the stylus lever, thereby avoiding the strain on the diaphragm 7 which would result if the weight of the sound box were transmitted through the upper and lower arms of the stylus lever. This elastic support of the sound box, which relieves the diaphragm of strain contributes materially to the efficiency, sensitiveness and tone-transmitting qualities of the sound box.

From the foregoing construction it will readily be seen that, in playing a record of the vertically undulating groove type, such as the Edison or the Pathé, an endwise vibration imparted to the stylus 14 by the record groove will vibrate the arm 12 of the stylus lever on the pivot pins 8 with a leverage equal to the distance between the pivot and the axis of the stylus, which vibration will be transmitted through the upper arm 10, 11 to the diaphragm 7; the spring 17 readily permitting such vibratory movement of the stylus lever. When a record of the laterally undulating type, such as the Victor or Columbia, is played, the stylus 14 is vibrated laterally, and this also causes a vibration of the lever arm 12 under a leverage equal to the distance between the point of the stylus and the horizontal plane of the pivot 8. By so shaping and organizing the parts that these leverages are substantially equal, substantially the same vibration effects are transmitted to the diaphragm when playing the two types of record, and substantially the same sound transmitting results are secured.

By producing a sound box capable of playing both types of record with the sound box in a single position relatively to the tone arm, and without requiring any shifting of the sound box between two positions in order to play both types of record, my invention effects a pronounced economy and simplicity in the matter of construction and mode of manipulation, as will be evident to those skilled in the art.

My invention further comprehends an improved means of attaching the stylus lever to the diaphragm, which is best shown in the detail view Fig. 4. Referring to this figure, it will be observed that the inwardly bent upper end portion 11 of the stylus lever is formed with a head 20, in the face of which is a socket 21 and a tapped hole 22 extending inwardly of the bottom of the socket 21. 23 designates a centering member consisting of a disk, preferably of the same diameter as the head 20, and a hollow stem or shank 24 that extends through a central aperture 25 in the diaphragm 7 and into the socket 21 of the head 20. Between

the diaphragm 7 and the head 20 and centering member 23 I preferably interpose a pair of gaskets or washers 26 of yieldable material such as rubber or felt; and these parts are all securely united by a clamp screw 27 that extends through the hollow stem 24 of the centering member and into the tapped hole 22 of the head 20. In assembling, the member 23 accurately centers the head 20 of the stylus lever with the central aperture 25 of the diaphragm, and the described construction insures the clamping of the stylus lever on the diaphragm in such a way as to effectively avoid any warping or twisting strains on the latter. This is due to the fact that the friction between the head of the clamp screw and the head of the centering member (both smooth metal surfaces) is much less than the friction that would exist between the head of the screw and the washer, were the centering member omitted. Consequently, in tightening the clamp screw, the twisting tendency of the washer on the center of the diaphragm is greatly reduced as compared with a construction omitting the centering member.

In Fig. 5 I show a yielding member 17', which may be a block or pad of rubber, felt, or the like, between the stylus holder 18' and a lug 16' on the rear of the sound box, in lieu of the spring 17, such yielding pad permitting the endwise vibration of the stylus when playing a record of the vertically undulating type.

In Fig. 6 I show a slight modification of the means for connecting the stylus lever to the diaphragm. In this case, instead of forming the head as an integral part of the lever, I employ a detachable head 20' forming a threaded joint with the upper end of the lever, and the opposed faces of this head and the head 23' of the centering member are given a protuberant form, slightly convexed as herein shown. Since, in vibrating, the upper end of the lever moves in the path of a tiny arc, this construction accommodates such movement somewhat more perfectly than the construction of Fig. 4.

The principle of the invention is obviously capable of embodiment in forms differing more or less in details from that herein shown; and hence I reserve as within the invention all such modifications as fairly fall within the purview and substance of the appended claims.

I claim:

1. The combination with the sound box of a talking machine, of a one-piece stylus lever pivotally mounted intermediate its ends on and externally of the sound box, the upper arm of said lever having an inwardly turned end connected to the diaphragm of the sound box and the lower arm of said lever extending downwardly



and inwardly beneath the sound box and at its free end provided with a transverse stylus socket, and a compression spring between said socket and the sound box through which a portion of the weight of the latter is yieldably transmitted to said lower lever arm.

2. In a sound box construction, the combination with an apertured diaphragm, of a stylus lever having a socketed diaphragm-engaging head, a centering member engaging the other side of the diaphragm and provided with a hollow stem extending through the aperture of the diaphragm and into the socket of said head, and a clamp-screw passed through the stem of said centering member and into the head of the stylus lever.

3. In a sound box construction, the combination with an apertured diaphragm, of a stylus lever having a socketed diaphragm-engaging head, a centering member engaging the other side of the diaphragm and provided with a hollow stem extending through the aperture of the diaphragm and into the socket of said head, a pair of washers between the opposite sides of said diaphragm and said centering member and head, respectively, and a clamp-screw passed through the stem of said centering member and into the head of the stylus lever.

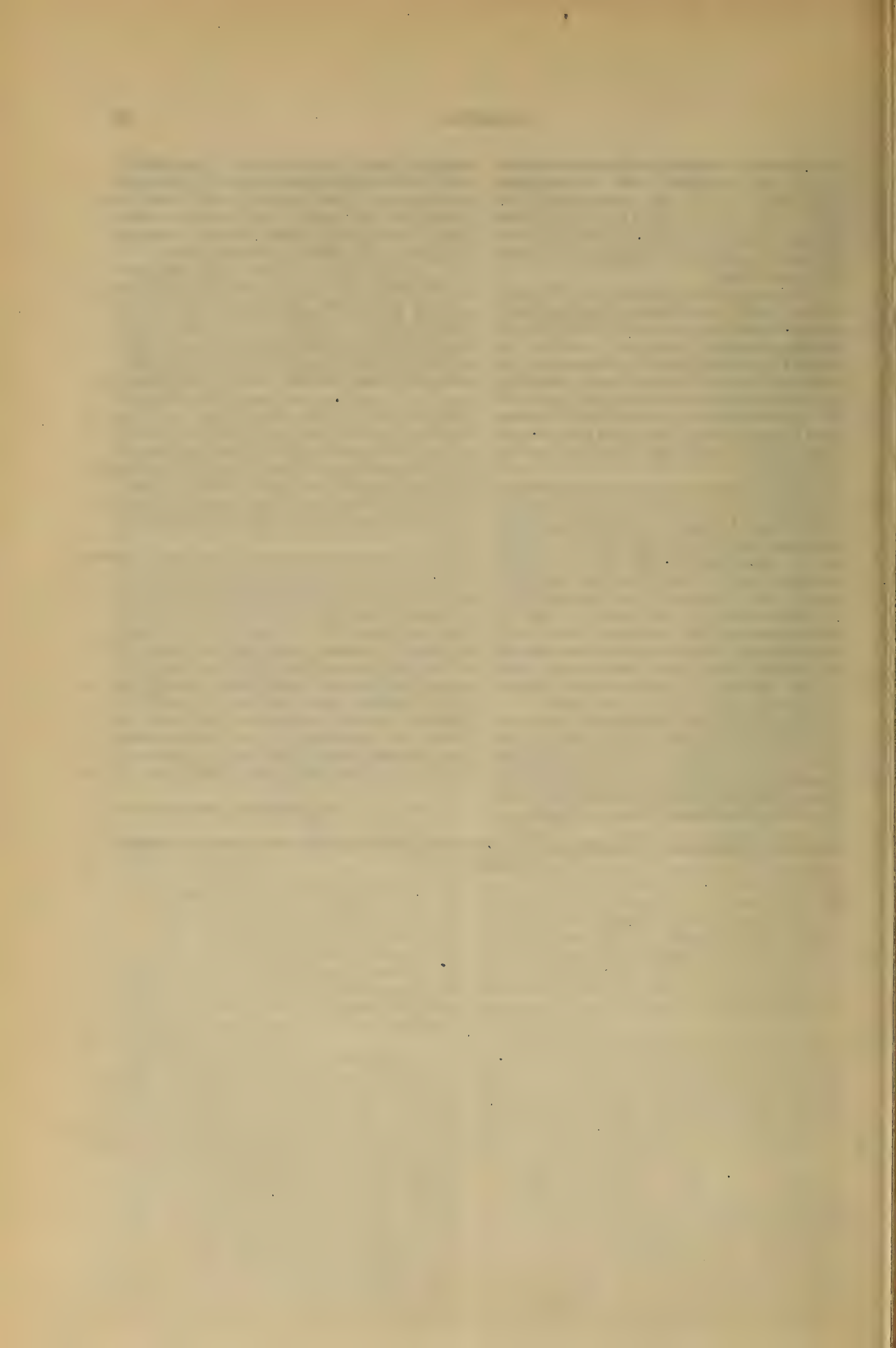
4. In a sound box construction, the combination with an apertured diaphragm, of a stylus lever having a socketed diaphragm-engaging head formed with a protuberant face, a centering member engaging the other side of the diaphragm having a diaphragm-

engaging head formed with a protuberant face and a hollow stem extending through the aperture of the diaphragm and into the socket of said head, and a clamp-screw passed through the stem of said centering member and into the head of said lever.

5. In a sound box construction, the combination with an apertured diaphragm, of a stylus lever having a socketed diaphragm-engaging head formed with a protuberant face, a centering member engaging the other side of the diaphragm having a diaphragm-engaging head formed with a protuberant face and a hollow stem extending through the aperture of the diaphragm and into the socket of said head, a pair of washers between the opposite sides of said diaphragm and the protuberant faces of said head and centering member, respectively, and a clamp-screw passed through the stem of said centering member and into the head of said lever.

6. In a sound box construction, the combination with an apertured diaphragm, of a stylus lever having a socketed diaphragm-engaging head formed with a protuberant face, and detachably mounted on said lever, a centering member engaging the other side of the diaphragm having a diaphragm-engaging head formed with a protuberant face and a hollow stem extending through the aperture of the diaphragm and into the socket of said head, and a clamp-screw passed through the stem of said centering member and into the head of said lever.

ALBERT A. HUSEBY.



tone arm mounting for  
sound reproducing machines,

Reissue 14,305-----H.C. Miller,  
Patented-May 22nd, 1917.  
Filed-October 20th, 1915.

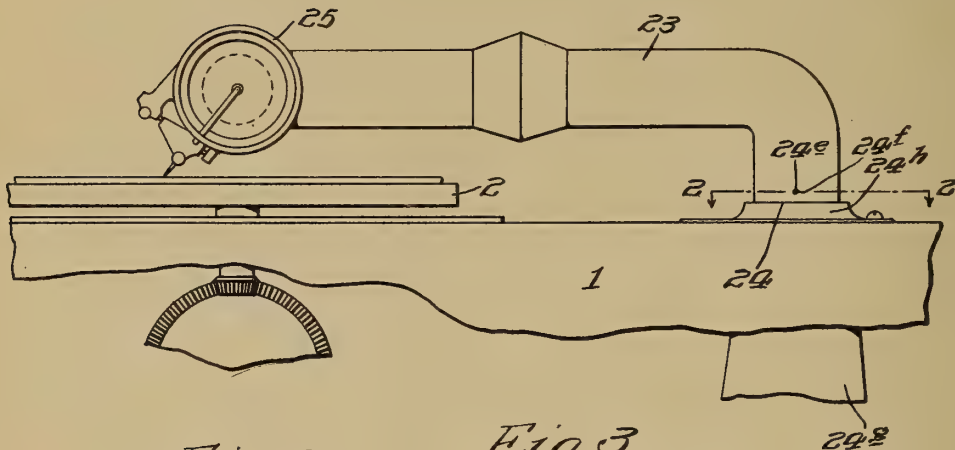


H. C. MILLER.  
TONE ARM MOUNTING FOR SOUND REPRODUCING MACHINES.  
APPLICATION FILED OCT. 20, 1915.

Reissued May 22, 1917.

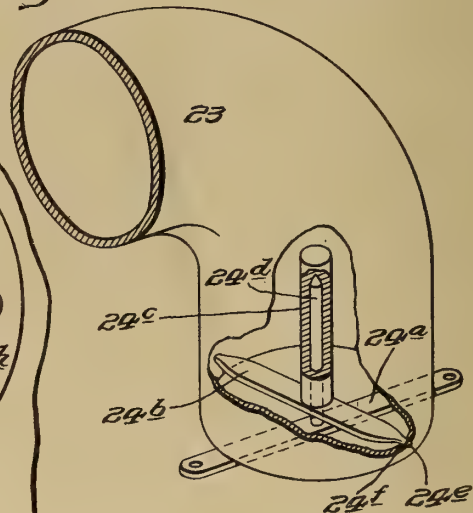
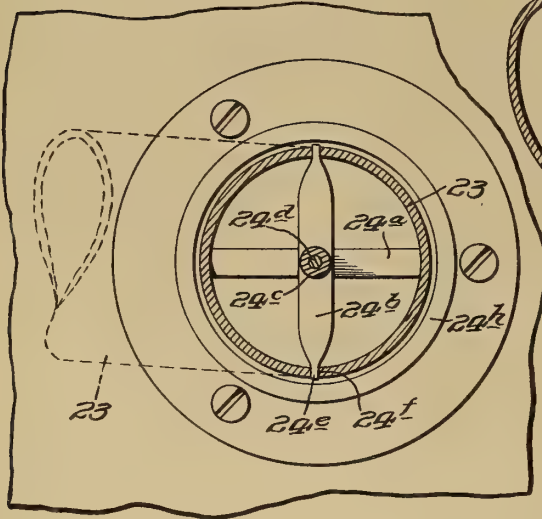
14,305.

*Fig. 1.*



*Fig. 2.*

*Fig. 3.*



INVENTOR

*Henry C. Miller.*

WITNESS

*F. G. Hartman.*  
*John D. Myers.*

BY

*Frederick Blount.*

ATTORNEYS

# UNITED STATES PATENT OFFICE.

HENRY C. MILLER, OF WATERFORD, NEW YORK, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, OF CAMDEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## 14,305. TONE-ARM MOUNTING FOR SOUND-REPRODUCING MACHINES.

Specification of Reissued Letters Patent. Reissued May 22, 1917.

Original No. 1,076,385, dated October 21, 1913, Serial No. 321,014. Original reissue No. 14,257, dated February 6, 1917, Serial No. 57,003. Application for this reissue filed October 20, 1915. Serial No. 57,004.

### DIVISION B.

*To all whom it may concern:*

Be it known that I, HENRY C. MILLER, a citizen of the United States, residing at Waterford, in the county of Saratoga and State of New York, have invented certain new and useful Improvements in Tone-Arm Mountings for Sound-Reproducing Machines, of which the following is a specification.

10 This invention relates to talking machines, and particularly to an improved coupling or mounting for the swinging sound conveyer or tone arm, the application being a division of the parent application filed of even date herewith, for the reissue of Letters Patent No. 1,076,385, granted to me on October 21, 1913, for an improvement in automatic stopping devices for sound-reproducing machines.

20 The invention consists specifically in the combination with a talking machine including a sound conveyer or tone arm adapted to carry the sound box across the record support, as is usual, of a mounting for said tone arm comprising a hollow support with which one end of said tone arm communicates, a pivot carried by one of said communicating parts, and a bearing carried by the other of said communicating parts, and adapted to turn on the pivot to permit the tone arm to swing across the record support about a substantially vertical axis, the bearing and the pivot being entirely inclosed within the tone arm and support, and being freely separable by lifting the tone arm in the direction of said pivot whereby to permit the tone arm to be readily removed from its hollow support, when desired.

40 The invention further consists in pivoting to the tone arm the coupling element carried thereby in order to permit the tone arm to turn on said element about a horizontal axis to move toward and away from the record support and thereby have universal movement.

50 In the accompanying drawing, Figure 1 is a fragmentary side elevation, showing my invention applied to a talking machine; Fig. 2 is an enlarged horizontal section on the line 2—2 of Fig. 1, and Fig. 3 is a de-

tail perspective view, partially broken away, illustrating the parts of the coupling in operative relation to the tone arm.

Referring to the drawing, the invention consists of a hollow sound conveyer or tone arm 23, which is provided at one end with a mounting or coupling 24, and which carries at its opposite end a sound box 25, the coupling permitting the tone arm to swing horizontally to carry the sound box across the turntable or record support 2 of a talking machine 1 of the disk type, the talking machine being only partially illustrated, as it is of the usual or any desired form, except for the parts herein specifically described. The tone arm has its end remote from the sound box turned downwardly and substantially perpendicularly to the major portion of the tone arm, and this downturned end is in coöperative relation to and communicates with the upwardly opening end of a hollow support 24<sup>h</sup>, this support being secured to or provided by the upper portion of the casing of the talking machine, and communicating with an amplifier 24<sup>e</sup>, which in the specific embodiment of the invention illustrated in the drawing, is of the inclosed type, and is located within the casing of the talking machine.

The means for coupling the downturned end of the conveyer to the hollow support consists essentially of a pivot post 24<sup>d</sup> carried by one of said parts, and a bearing 24<sup>c</sup> carried by the other of said parts, and adapted to telescope with the pivot post and to have turning movement relatively thereto. In the present instance the pivot post is carried by the hollow support, although it is to be understood that it is not necessarily so mounted, and is disposed coaxially within the hollow support 24<sup>h</sup>, and extends vertically upwardly beyond the upper end of said support.

As the preferred means for supporting the pivot post, I have shown a support or bar 24<sup>a</sup> which extends across the hollow support 24<sup>h</sup>, and is secured at its ends thereto or to an adjacent fixed part of the talking machine.

The bearing 24<sup>c</sup> is carried by a support or bar 24<sup>b</sup>, which extends across the down-



turned end of the tone arm 23. At its lower end the bearing is open in order to permit it to fit over and telescope with the pivot post 24<sup>a</sup>, the bearing being adapted to turn 5 on the pivot post and thus permit the tone arm 23 to swing horizontally on a vertical axis to cause the sound box 25 to traverse a record on the turntable 2. The ends of the support 24<sup>b</sup> are reduced to form journals 10 24<sup>c</sup> having bearings at 24<sup>d</sup> on opposite sides of the tone arm. This arrangement permits the tone arm to turn on said journals about a horizontal axis to enable the sound box to be moved toward or away 15 from the record support, as may be desired to bring the stylus into or out of operative engagement with a record.

By means of this invention a coupling is provided which is very simple and efficient, and which may be readily separated, when 20 desired, by merely lifting the tone arm to withdraw the bearing from the pivot post. It is also to be noted that the pivot post and bearing, as well as the support therefor, are 25 wholly inclosed by the tone arm and the hollow support 24<sup>b</sup> in the operative position of the parts, and hence the coupling is entirely out of the way and is protected from accidental injury through contact.

30 What I claim is:—

1. In a sound reproducing machine, the combination with a sound conveyer having a sound box attached to one end, and a coupling at the opposite end of the sound conveyer, said coupling comprising a support 35 provided with a pivot, and a bearing fitting freely over the pivot and pivoted to the sound conveyer, and an amplifier communicating with the sound conveyer, whereby 40 said conveyer and pivoted bearing may be freely removed from said pivot and support and amplifier.

2. In a talking machine, a sound conduit comprising two members, a hollow support

having an upwardly disposed open end, 45 forming one of said members, a tone arm having a downwardly disposed open end co-operating with the open end of said support, forming the other of said members, and a pivot carried by one of said members and 50 rotatively connecting said tone arm to said support, said arm being freely removable from said support.

3. In a talking machine, a sound conduit comprising two members, a hollow support 55 having an upwardly disposed open end, forming one of said members, a tone arm having a downwardly disposed end in co-operative relation with the upwardly disposed end of said support, forming the other 60 of said members, and a pivot carried by one of said members and rotatively connecting the same and wholly inclosed by said tone arm and said support, said tone arm being 65 freely removable from said support.

4. The combination with a hollow support having an upwardly disposed open end, of a tone arm having a downwardly disposed end in co-operative relation with said upwardly 70 disposed end, and a pivot carried by said hollow support and rotatively connecting and wholly inclosed by said tone arm and said support, said tone arm being freely 75 removable.

5. The combination with a hollow support 75 having an upwardly disposed open end, of a tone arm having a downwardly disposed end in co-operative relation with said upwardly disposed end, and a pivotal connection to permit vertical and horizontal swing- 80 ing movement of the tone arm, located at said ends of and entirely inclosed by the hollow support and tone arm, said tone arm being freely removable.

In testimony whereof I have signed my 85 name to this specification.

HENRY C. MILLER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



CUSHION-SUPPORT FOR PIVOT-  
JOINTS,

#1,228,406-----Forest Cheney,  
Patented-June 5th, 1917.  
Filed-Sept. 22nd, 1913.

F. CHENEY.  
CUSHION SUPPORT FOR PIVOT JOINTS.  
APPLICATION FILED SEPT. 22, 1913.

1,228,406.

Patented June 5, 1917.  
2 SHEETS—SHEET 1.

Fig. 1

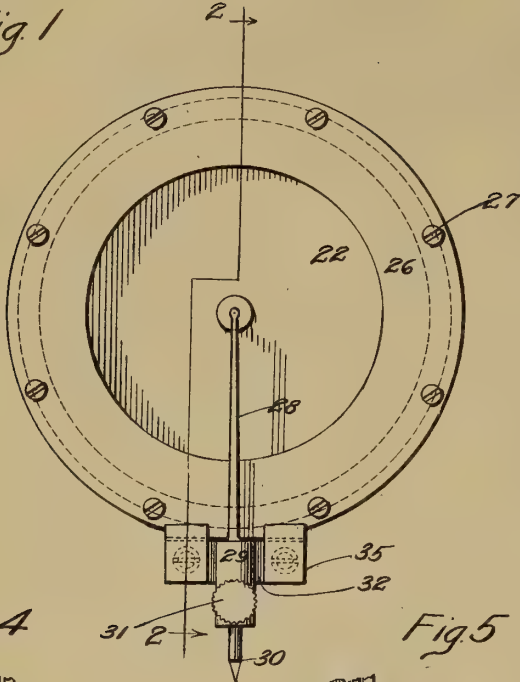


Fig. 2

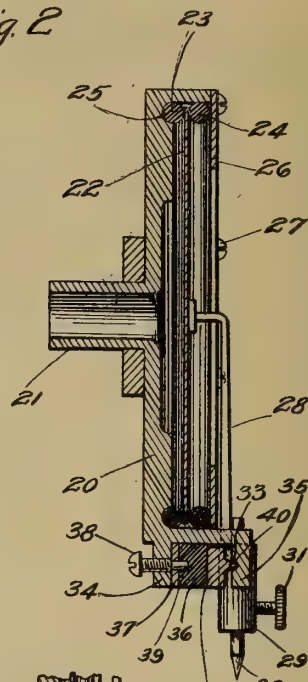


Fig. 4

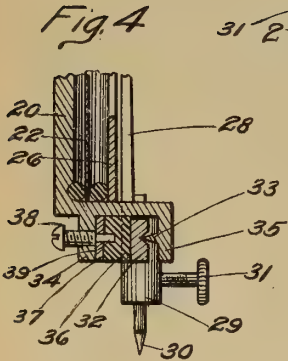


Fig. 5

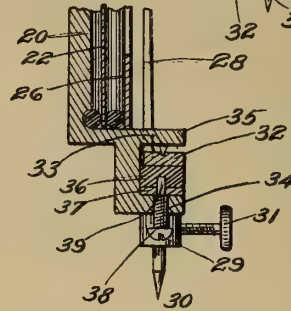
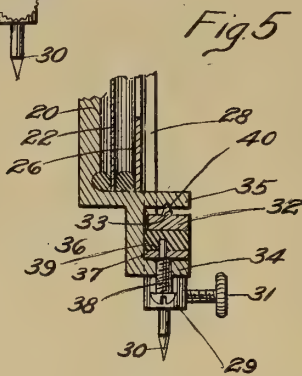
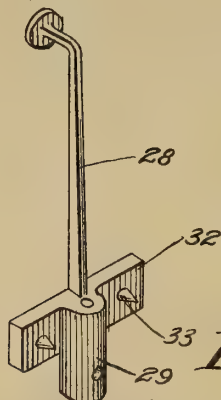


Fig. 6

Fig. 3



Witnesses:

*C. Burnap*  
By *Maurice B. Con*

Inventor:

*Forest Cheney*

Att'y's





F. CHENEY.  
CUSHION SUPPORT FOR PIVOT JOINTS.  
APPLICATION FILED SEPT. 22, 1913.

1,228,406.

Patented June 5, 1917.  
2 SHEETS—SHEET 2.

Fig. 7

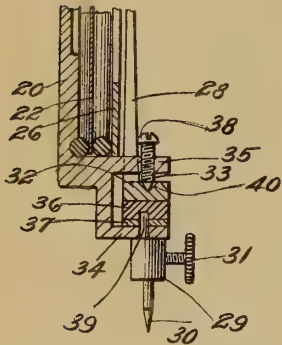


Fig. 9

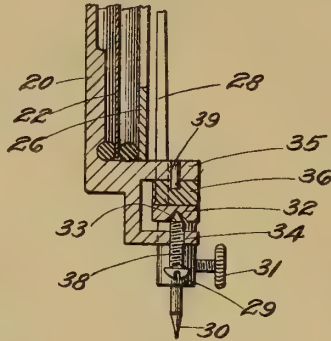


Fig. 10

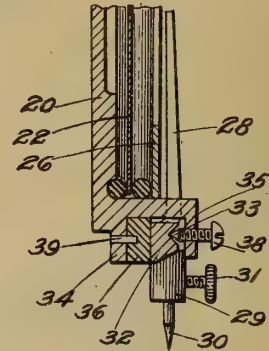


Fig. 8

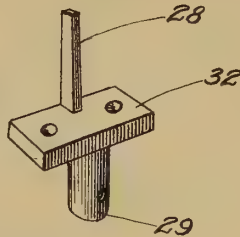


Fig. 11

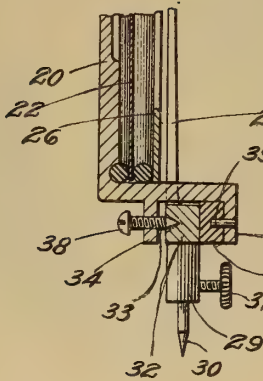


Fig. 13

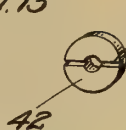


Fig. 12

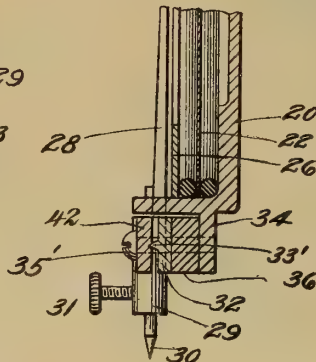
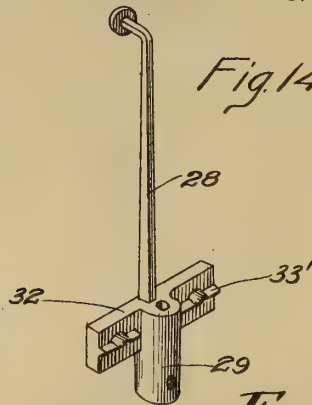


Fig. 14



Witnesses:

C. Burnap

Maurice D. By

Sheridan Wilkinson, Scott

Inventor:

Forest Cheney

Atty's

# UNITED STATES PATENT OFFICE.

FOREST CHENEY, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO CHENEY TALKING MACHINE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

CUSHION-SUPPORT FOR PIVOT-JOINTS.

1,228,406.

Specification of Letters Patent. Patented June 5, 1917.

Application filed September 22, 1913. Serial No. 791,239.

*To all whom it may concern:*

Be it known that I, FOREST CHENEY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Cushion-Supports for Pivot-Joints, of which the following is a specification.

The principal object of my invention is to provide a new and improved pivotal support for the needle or stylus of a gramophone reproducer.

Another object of my invention is to provide a gramophone reproducer with means for mounting and supporting the needle so as to improve the quality of the tone and eliminate certain objectionable tone components that occur in connection with the ordinary needle mounting.

All these objects and others will be made apparent in the following specification and claim taken with the accompanying drawings, in which I have illustrated a few embodiments of my invention. It will be understood that the invention is defined in the appended claim.

Referring to the drawings:—

Figure 1 is an elevation of a gramophone reproducer.

Fig. 2 is a vertical section of the same on the line 2—2 of Fig. 1.

Fig. 3 is a perspective view of the needle-carrying lever.

Figs. 4, 5, 6 and 7 illustrate modifications in the pivot members for this lever.

Fig. 8 is a perspective view of the lever as employed in the modification of Fig. 7.

Figs. 9, 10, 11 and 12 illustrate further modifications of the pivot members.

Fig. 13 is a perspective view of a bearing washer for the pivot of Fig. 12, and

Fig. 14 is a perspective view of the lever of Fig. 12.

Referring to Figs. 1, 2 and 3, the reproducer chamber wall 20 has an opening 21 through which the sound waves are delivered from the diaphragm. This diaphragm 22 is clamped between the rubber rings 23 and 24, the ring 23 lying in the annular channel 25. These parts are thus secured in proper relation by the annular plate 26 fastened by the screws 27.

The lever 28 of the form shown in Figs. 2 and 3 has its upper end attached to the center of the diaphragm 22; below it is expand-

ed into a block 29 carrying a cross bar 32 with a pair of projecting pivot points 33. The block 29 has a hole therethrough in which is mounted the needle or stylus 30 clamped by the screw 31.

A pair of lugs 34 and 35 depend from the chamber wall 20. Adjacent to the cross bar 32 and on the opposite side thereof from the pivot points 33 is a cushion 36 of soft rubber or other suitable material. Adjacent to the cushion 36 is a metal clamping plate 37 engaged by the shoulder on the screw 38 which passes through the lug 34. The screw 38 has a reduced extension 39 beyond the shoulder which passes through a hole in the plate 37 and into a socket in the cushion 36; this projection 39 is designed to support the cushion 36 so that it will not drop down.

The depending lug 35 has conical pits or sockets designed to receive the pivot points 33. A plane determined by the point of the needle and the two pivot points 33 should also contain the axis of the needle 30.

It will be seen that the cross bar 32 lies against the cushion 36 and the pressure by which the pivot points 33 engage the sockets 40 is transmitted through the cushion 36 and the degree of this pressure may be adjusted by means of the set screw 38.

In Fig. 4, the points are carried by the stationary lug and the conical sockets are in the cross bar.

In Fig. 5 the points are carried by the cross bar 32 but are directed upwardly instead of horizontally and the abutment 35 with its sockets 40 is above.

In Fig. 6 there is simply an interchange between the points and sockets as compared with Fig. 5.

In Fig. 7 the screw 38 is made to carry the pivot point 33 and the socket 40 is on the cross bar 32 as in Fig. 6. The form of the lever used in the device of Fig. 7 is shown in Fig. 8.

In Fig. 9 the pivot point is directed upwardly instead of downwardly as in Fig. 7.

In Fig. 10 the pivot point carried by the screw 38 is directed horizontally toward the left.

In Fig. 11 the pivot point 33 carried by the screw 38 is directed horizontally toward the right.

In Fig. 12 I substitute the knife-edge 33', (see Fig. 14) for the points heretofore described. These knife-edges are interrupted

by the holes through the cross bar 32 to receive the screws 35'. Under the heads of the screws 35' are washers 42 with V-shaped channels 43 to afford seats for the knife-edges 33'.

It will be seen that in all these cases I provide a cushion adjacent the cross bar of the lever and that the pivot members supporting this lever and cross bar are pressed together through the cushion. I have found as a result of much study and experiment that this device affords a decided improvement in the quality of the tone given by a phonograph reproducer.

I claim:—

In a sound box for sound reproducing machines, the combination with the frame of the box, of a stylus-supporting lever having a cross bar thereon, spaced parallel supporting members projecting from the pe-

riphery of said frame between which said cross bar is located, one of said members and one side of said cross bar carrying respective elements of two pin and socket pivot joints, one pivot joint being located at each side of said lever, a cushion between the other of said members and the other side of said cross bar, and screws alining with said pivot joints and adjustably extending through said last-named member for compressing said cushion against said cross bar to maintain the elements of said two pivot joints in contact with each other.

In testimony whereof, I have subscribed my name.

FOREST CHENEY.

Witnesses:

GEO. L. WILKINSON,  
HELEN FREUND.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



TALKING-MACHINE CABINET,  
#1,228,446-----Alva D. Jones,  
Patented-June 5th, 1917.  
Filed-February 1st, 1917.

A. D. JONES.  
TALKING MACHINE CABINET.  
APPLICATION FILED FEB. 1, 1917.

1,228,446.

Patented June 5, 1917.

FIG. 1.

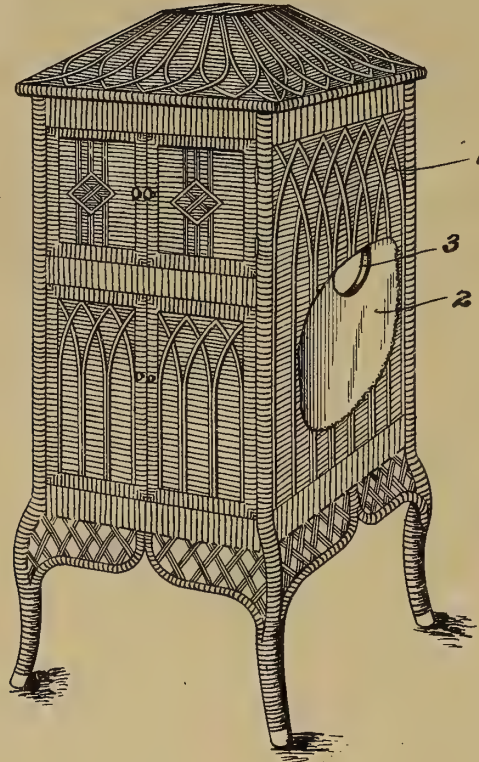


FIG. 2.

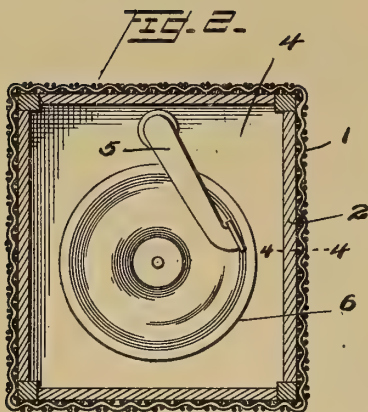


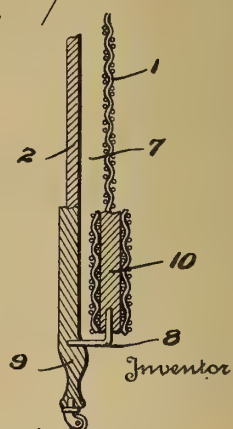
FIG. 3.



FIG. 4.



FIG. 5.



Witnesses

Harold Strauss  
Millicent Rogers.

A. D. Jones

# UNITED STATES PATENT OFFICE.

ALVA D. JONES, OF PHILADELPHIA, PENNSYLVANIA.

## TALKING-MACHINE CABINET.

1,228,446.

Specification of Letters Patent.

Patented June 5, 1917.

Application filed February 1, 1917. Serial No. 145,990.

*To all whom it may concern:*

Be it known that I, ALVA D. JONES, a citizen of the United States, residing in the city and county of Philadelphia and State of Pennsylvania, have invented a new and useful Talking-Machine Cabinet, of which the following is a specification.

My invention relates to a novel way or method of dampening out sympathetic sounds set up in the supporting structure or cabinet of a sound reproducing or conveying device and dealing in this instance with the supporting structure or cabinet portion of a talking machine, of the internal horn type. Cabinets as they have been built in the past are constructed in such a manner and of such material as to be extremely resonant, thereby sympathizing with the original tones coming from the record, thus setting up foreign sounds throughout their structure, where as a matter of fact, only the amplifier itself should respond to the original vibrations, and this to a limited extent, and only at its mouth, as a talking machine is a rehandling device and should only amplify by reason of the shape of the passage through which its sounds must travel rather than by secondary vibrations set up in the walls of the cabinet, which in every instance distorts and in the majority of cases renders unrecognizable many of the more beautiful shadings of the music coming from the record. As stated, a talking machine is essentially a rehandling or reproducing sound instrument, consequently we must consider this device almost if not entirely acoustically neutral. The cabinet portion or supporting structure should not play any part in the building up of the tones coming from the record, which should be left entirely to the amplifying passage, which is of the utmost importance with respect to shape, size and the material of which it is constructed. The amplifier or horn, sound box and tone arm, are acoustically the vital elements in a talking machine, and their arrangement, and protection from foreign influences should be treated with the utmost seriousness.

In my Patent #1,193,366 of August, 1916, I referred in a comparatively brief manner to musical vibrations occurring entirely within a talking machine, as well as when a piano is affected by reason of the sympathetic vibratory relations existing between its own sound producing elements, and those of a separate sound producing substance.

In this patent I refer to a non-resonant music cabinet and describe the same as being preferably formed from reed, such as cane, ratan, willow, or similar elements, so arranged as to have no inherent fundamental tone, thereby constituting what I desire to call a non-resonant music cabinet. In my continued experiments I find it practical to greatly improve the construction of a substantially non-resonant music cabinet, such as I have just referred to and greatly increase the strength and utility of the same by plaiting the reed or otherwise arranging it in close proximity to an inner casing which is perforated wherever air pockets, such as surround the internal horns of many types of talking machines, are present, thereby giving a free circulation of air around the amplifier, so that its vibrations are unrestrained. In this way I secure results equal to those obtained in the external horn machine, yet the amplifier is concealed from view by a beautiful cabinet, taking up less space than the external horn which is acknowledged by all talking machine experts to be superior to inclosed sound chambers. The inner shell is so damped with respect to vibration by the proximity of the outer case, that it is not affected by the sound passing through the amplifier contained within the same, thus preventing any foreign or extraneous sounds from interfering with the original, and at the same time affording a most desirable dust proof receptacle.

My improvement in a music cabinet is instantly verified by a simple test which may be made by any one.—By striking a drinking glass with a pencil, it will be found that a crisp resonant tone is heard. Then take the same glass and press between the index finger and thumb at or near its top. Upon striking it the observer will find that practically 50% of the resonance is damped out, due to the controlling effect of the soft finger tips. Another illustration of the novelty and merit of my new talking-machine cabinet may be easily and quickly made by playing a talking machine in an empty room. A great confusion of echoes set up by the walls of the room will be heard, and but very little detail of the music. A similar condition to this exists in the walls of the talking machine cabinet itself, and is overcome by my invention which damps out and otherwise prevents the excessive resonance in the solid casing.



I have accomplished the latter result by employing the use of an internal lining, made of board or even metal,—then having an external or damping case made over or made  
 5 fixed in any suitable manner to the inner shell, thus forming a multiple wall music cabinet, so arranged and adjusted that one of the walls controls the excessive sympathetic resonance of the other, thus preventing  
 10 any foreign sounds from intermingling with the original tones. I preferably construct this cabinet with the outer case pressing against the inner shell, thereby damping out by physical contact, the excessive  
 15 resonance of the inner case, and I also accomplish the same purpose in my modified form by placing a plaited case over the inside lining, but out of physical contact therewith, thereby controlling the foreign  
 20 sounds in the same manner as does a piece of gauze, silk, or other like substance when placed in the customary manner at the mouth of the horn. In talking machines of  
 25 I observe that the various sounds coming from the record find various parts of the cabinet to a greater or less degree in sympathy with the original vibrations. This observation is made in a most simple manner,  
 30 —by playing a talking machine and pressing the hands firmly against the walls at various places. You will find certain notes will affect separate and distinct parts of a single board, but more decidedly will  
 35 they affect the various boards going to make up the cabinet. The disturbance of the walls of the talking machine set up a sound which passes outwardly from the location of the disturbance, consequently this sound  
 40 does not pass through the amplifier and is adulterated, distorting greatly the purity of the original tones, as it mixes with them in the room. But I have found that I can substantially reduce and purify these cabinet  
 45 vibrations by placing a reed case over the solid case, without even coming in physical contact with same, so that when the sounds set up in the cabinet portion of the talking machine proper pass through the  
 50 strands of reed, we have a condition of sound purification not greatly unlike that resulting from the stretching of wires in an auditorium for this identical purpose, which is thoroughly familiar to acousticians.  
 55 To the above ends my invention consists of a novel construction of a talking machine cabinet or support therefor, the novel features of which will be hereinafter fully set forth and particularly pointed out in the claims. It further consists of other novel  
 60 features of construction all of which will be hereinafter fully set forth. For the purpose of illustrating my invention I have shown in the accompanying drawings a preferred form, which at present is preferred

by me since the same will be found in practice to give satisfactory and reliable results, although it is to be understood that the various instrumentalities of which my invention consists may be variously arranged and  
 70 organized and that my invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown and described.

Figure 1 represents a perspective view of  
 75 a talking machine cabinet embodying my invention being broken away at the side to show its complete formation. Fig. 2 shows a plan view of a talking machine, tone arm, turn table, and motor-board, surrounded by  
 80 my novel construction of a cabinet.

Fig. 3 is a diagrammatic section of a portion of the side wall of a talking machine, showing a greatly magnified vibratory movement resulting from the motion of sound  
 85 waves.

Fig. 4 shows a complete section taken on dotted lines 4—4 of Fig. 2 through one wall of my novel talking machine cabinet with the plaited case pressing firmly against the  
 90 solid board or inner case.

Fig. 5 is a slight modification of Fig. 4 which shows the plaited case slightly spaced away from the board case. Similar numerals of reference represent corresponding parts  
 95 in the figures.

Referring to the drawings, 1 represents my novel construction of a talking machine cabinet, 2 represents the inner lining of said case, 3 represents a perforation of a confined  
 100 air chamber.

Fig. 2 is a plan in section of Fig. 1, in which 1 indicates the plaited case which surrounds the inner board case 2, 4 represents a support on which rests the tone arm 5 and  
 105 the turn table 6 ready for reproducing a talking machine record in any well known manner.

Fig. 3 is a section of a board diagrammatically illustrating in a greatly magnified  
 110 manner the vibratory movement in the walls of the ordinary talking machine when the machine is reproducing. 2 shows the board at rest, while the dotted lines 2' indicate the extent of vibration which creates an atmospheric motion and discolors the original  
 115 tones.

Fig. 4 is a section of Fig. 1 taken on dotted lines 4—4 and serves to illustrate how I hold the inner wall of my new talking machine  
 120 cabinet neutral and prevent extraneous and excessive reasonance of the inner wall 2 by the proximity of the plaited case 1.

Fig. 5 is a modified form of Fig. 4 in which the plaited case is out of actual physical contact with the inner case and serves to smother the cabinet sounds by preventing  
 125 them from passing through the plaited case 1 which is spaced away from the board case 2 leaving the space 7 formed between said  
 130

cases. The corner post 10 of the plaited case 1 is held in position by the angle pin 8 which is made fast to the leg 9 of the inner case 2.

5 So far as I am aware, I am the first in the art to produce a multiple wall, sound-controlled talking machine cabinet. It is to be understood that while I have more particularly referred to cane, ratan, or reed, the results may be obtained by using felt, cloth, or other sound-deadening substances which are to be construed as coming within the scope of my claims. I have also shown the non-resonant casing as the outer casing. I have  
10 obtained very satisfactory results by making the inner casing non-resonant, and surrounding it with a resonant casing, and consider this to be within the scope of my invention. I consider, however, the provision of the exterior non-resonant casing, and the inner resonant casing, as the preferred embodiment of my invention. Consequently, my claims to my novel method of construction of same, for the purpose described, are to be construed with the corresponding scope awarded a pioneer invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

30 1. A cabinet talking machine comprising an inner and an outer casing, one casing being resonant and the other non-resonant, and talking machine mechanism within said inner casing including an amplifier discharging through an opening in the wall of said inner casing, whereby the vibrations produced in the walls of the resonant casing are damped by the non-resonant casing.

40 2. A cabinet comprising an inner resonant casing and an outer non-resonant casing, in combination with a sound reproducing mechanism within said cabinet.

45 3. The combination with sound reproducing mechanism, of a cabinet therefor having double side walls, the inner of said walls being capable of sympathetic sound vibrations and the outer of said side walls being incapable of sympathetic sound vibrations.

4. A cabinet, the side walls of which have

*per se* an inherent fundamental tone, and means associated with the outside of said side walls to render them incapable of sympathetic sound vibrations, in combination with sound reproducing mechanism within said cabinet. 50 55

5. A cabinet talking machine comprising an inner resonant casing and an outer non-resonant casing, and talking machine mechanism within said inner casing having an amplifier discharging through an opening in one or more of the walls thereof, whereby the vibrations produced in the walls of the resonant casing are damped by the non-resonant casing. 60 65

6. A cabinet comprising a multiplicity of walls, said walls coacting in such a manner as to damp the excessive resonance of each other, and sound amplifying means within and discharging through the walls of said cabinet. 70 75

7. A talking machine cabinet having reproducing mechanism therein, a cover for said cabinet, said cover comprising an inner part of resonant material and an outer enclosing part of non-resonant material, whereby excessive vibrations of the resonant part of the cover are damped by the non-resonant portion.

8. A cabinet having a plurality of walls one of which is foraminous and non-resonant and serves to damp the resonance of a juxtaposed wall, in combination with a sound reproducing mechanism discharging into said cabinet, the sound vibrations propagated by said mechanism and discharged into the space within said cabinet passing from such space through the walls of the cabinet. 80 85

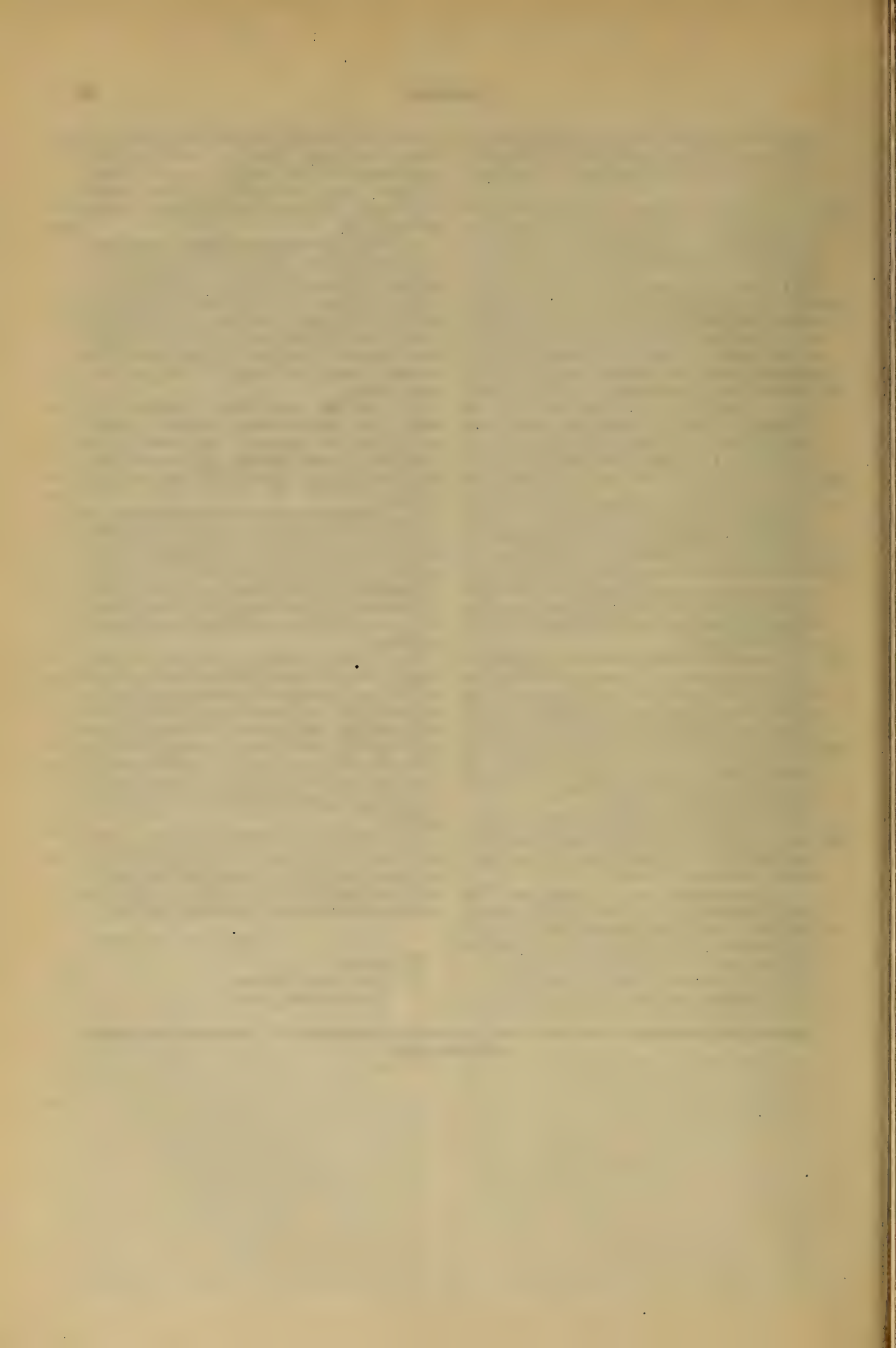
9. A cabinet for a talking machine having an inner supporting structure surrounded by a sound damping covering forming part of said cabinet, with a sound reproducing mechanism contained within said cabinet. 90

ALVA D. JONES.

Witnesses:

MILLCENT ROGERS,  
VERNON STANTON.







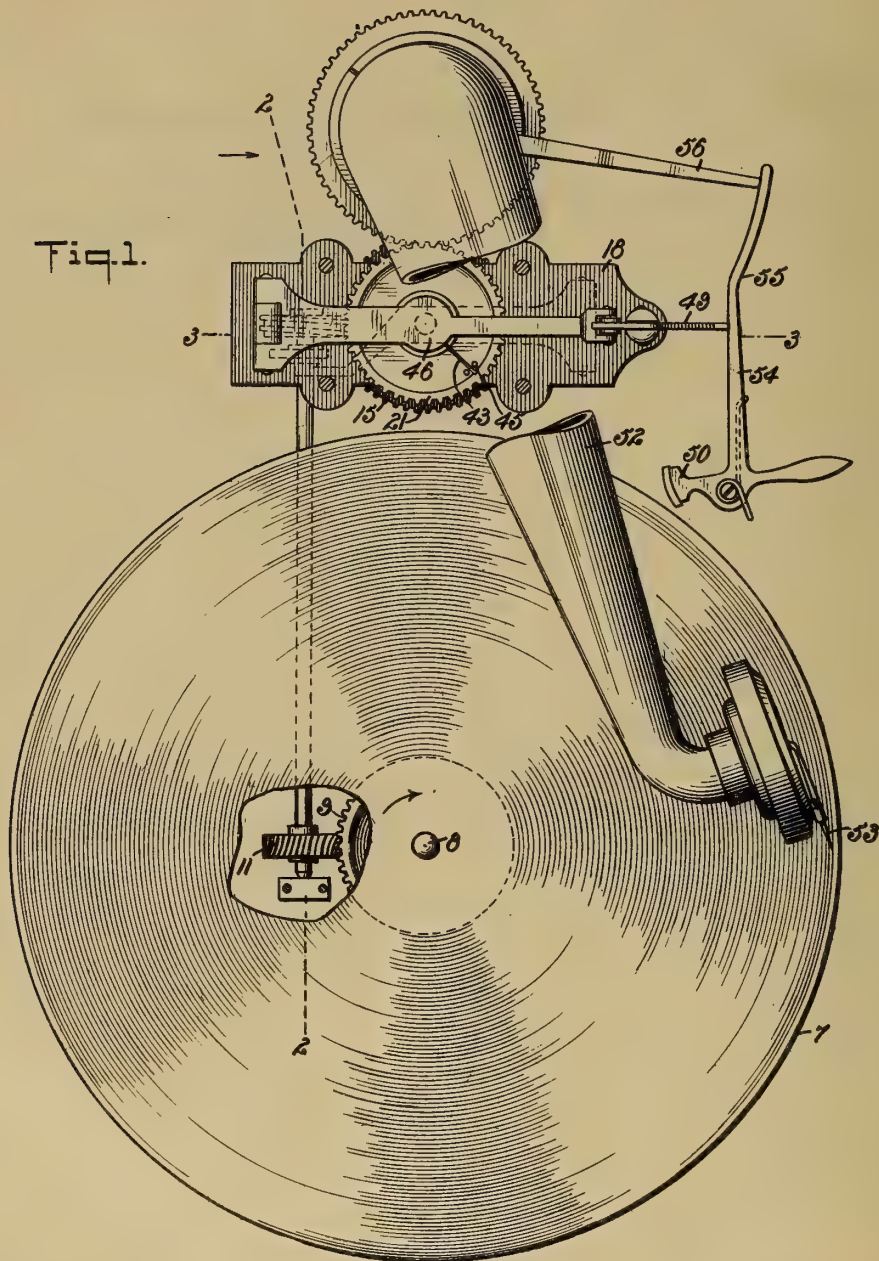
AUTOMATIC STOP FOR TALKING  
MACHINES,

#1,228,564-----A. Junod,  
Patented-June 5th, 1917.  
Filed-May 23rd, 1916.

A. JUNOD.  
 AUTOMATIC STOP FOR TALKING MACHINES.  
 APPLICATION FILED MAY 23, 1916.

1,228,564.

Patented June 5, 1917.  
 2 SHEETS—SHEET 1.



WITNESSES

*W. C. Smith*  
*W. C. Smith*

INVENTOR

*A. Junod*

BY

*M. M. Co.*

ATTORNEYS

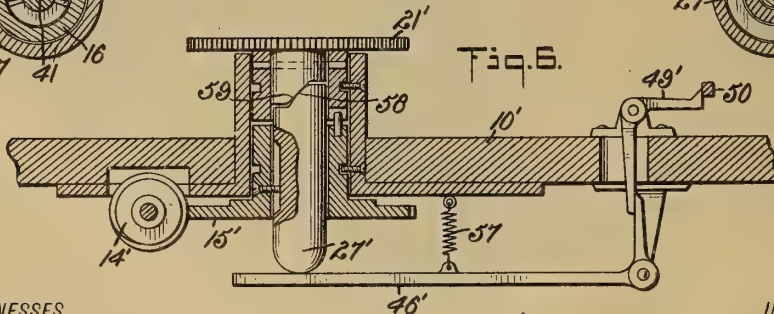
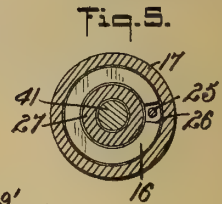
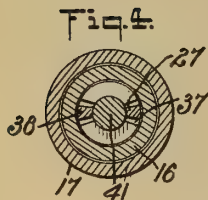
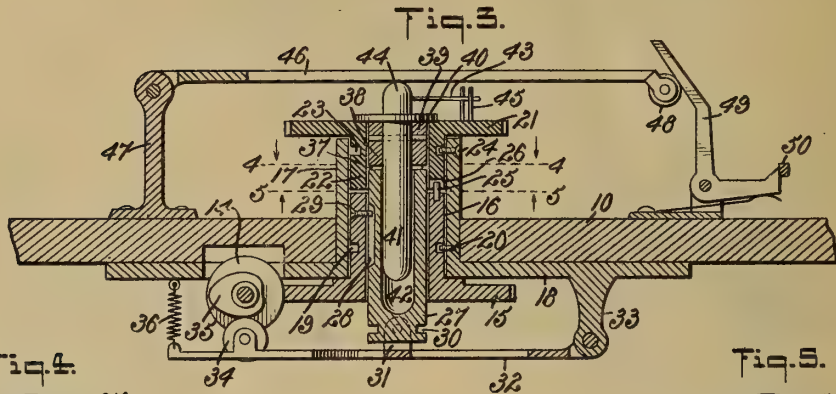
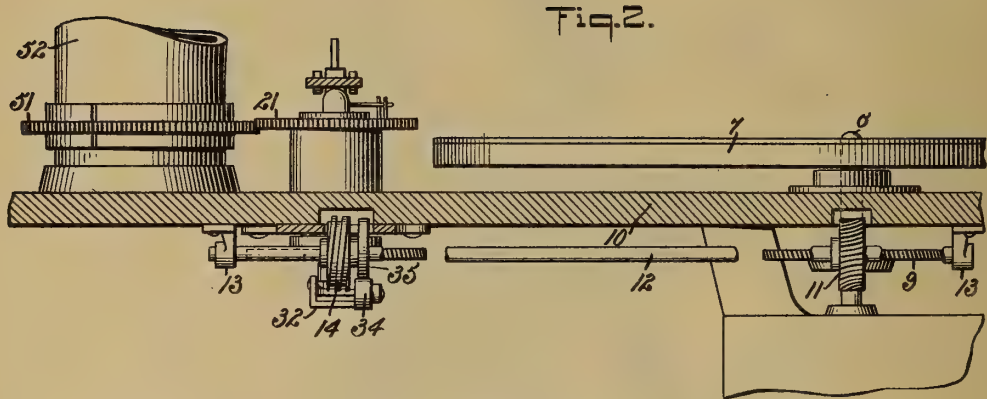




A. JUNOD.  
 AUTOMATIC STOP FOR TALKING MACHINES.  
 APPLICATION FILED MAY 23, 1916.

1,228,564.

Patented June 5, 1917.  
 2 SHEETS—SHEET 2.



WITNESSES  
*[Signature]*  
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# UNITED STATES PATENT OFFICE.

ANDRÉ JUNOD, OF NEW YORK, N. Y.

AUTOMATIC STOP FOR TALKING-MACHINES.

1,228,564.

Specification of Letters Patent.

Patented June 5, 1917.

Application filed May 23, 1916. Serial No. 99,274.

*To all whom it may concern:*

Be it known that I, ANDRÉ JUNOD, a citizen of Switzerland, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Automatic Stop for Talking-Machines, of which the following is a full, clear, and exact description.

My invention relates to an automatic stop for talking machines which coöperates with the brake of the talking machine and automatically applies the brake to the plate or record support when the end of a sound groove is reached by the stylus. The object of the invention is to provide a simple, efficient and sensitive stop which can be made to apply the brake as soon as the end of the sound groove is reached or at a certain interval of time after the end of the sound groove has been reached by the stylus.

With the above and other objects in view, the nature of which will more fully appear as the description proceeds, the invention consists in the novel construction, combination and arrangement of parts as herein fully described, illustrated and claimed. In the accompanying drawings, forming part of the application, similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a plan view of a talking machine equipped with my stop, the amplifying arm being partly broken out to show the details of construction;

Fig. 2 is a vertical section on line 2—2, Fig. 1;

Fig. 3 is a vertical section on line 3—3, Fig. 1;

Fig. 4 is a horizontal section on line 4—4, Fig. 3;

Fig. 5 is a similar section on line 5—5, Fig. 3; and

Fig. 6 is a longitudinal section through a modified form of the automatic stop.

Referring to the drawings, 7 is the record support connected to the shaft 8 of the motor (not shown). The shaft carries also a worm wheel 9 below the top 10 of the talking machine housing. The wheel is constrained to rotate with the shaft and is in mesh with a worm 11 carried by a shaft 12 supported in suitable bearings 13 suspended from the housing top 10. The shaft 12 carries also a worm 14 which meshes with a

worm wheel 15 the collar 16 of which wheel bears within a socket 17 extending through the housing top 10. The socket has a flange 18 at the under side of the top whereby the socket is secured to the top. The collar 16 has a circular groove 19 engaged by a pin 20 carried by the socket whereby the wheel 15 is free to turn but prevented from axial displacement within the socket.

A gear 21 is mounted to revolve on the top of the socket. It has a collar 22 which bears within the socket 16. The collar 22 has a circular groove 23 engaged by a pin 24 carried by the socket and which allows a rotary movement of the gear 21 but prevents an axial displacement of the same relative to the socket. The collar 16 of the wheel 15 carries a pin 25 which engages a notch 26 in the collar 22 whereby the two gears have a limited relative rotary movement.

A plunger 27 is mounted co-axially within the collar 16. Its axial movement therein is limited by a groove 28 which engages a pin 29 carried by the collar. This pin constrains the plunger to rotate with the wheel 15. The end of the plunger projecting through the wheel has a circular groove 30 engaged by the pins of a yoke 31 forming part of an arm 32, one end of which is pivotally attached to the extension 33 of the flange 18. The other end of the arm carries a roller 34 which is maintained against a cam 35 on the shaft 12 by a spring 36. The cam, being constrained to rotate with the shaft, reciprocates the plunger within the collar.

The end of the plunger projecting above the collar has a pair of diametrically-opposite notches 37 which are in register with teeth 38 of a member 39 alining with the plunger 27 and supported by the gear 21 within its collar through the medium of a flange or head 40 provided on said member. The member 39 has a downward extension 41 entering a bore 42 in the plunger and whereby an additional guide for said member is provided to prevent the binding of the same in the collar 22 when said member 39 is moved axially. The said member is coupled to rotate with the gear 21 by a yielding member 43 which extends from the upward extension 44 of the member 39 to pins 45 carried by the gear.

The upward extension 44 of the member 39 supports an arm 46, one end of which is



pivoted to a bracket 47 rising from the housing top 10. The other end of said arm carries a roller 48 which bears against a spring-actuated trip 49. The trip normally prevents the spring-actuated brake shoe 50 from engaging the record support 7.

The gear 21 meshes with a gear 51 carried frictionally by the amplifying arm 52 of the talking machine. The gear 51 will rotate the gear 21 as the amplifying arm is moved by the spiral sound groove of the disk. The ratio of said gears 51 and 21 is such that the speed of said gear 21 is equal to the speed of the wheel 15. When the stylus 53 has reached the end of the spiral sound groove on the record, the movement of the amplifying arm 52 is arrested and therewith the rotation of the gear 21, while the rotation of the wheel 15 continues. The plunger 27 reciprocates a few times for a single revolution of the wheel 15. With each reciprocation the notches 37 of the plungers are moved out from engagement with the teeth 38 of the member 39.

As the wheel 15 and the gear 21 rotate the teeth and the notches are maintained in register, but when the gear 21 is arrested and the wheel 15 continues to rotate, the register between the teeth 38 and the notches 37 is disturbed. Therefore, as the plunger 27 goes up the teeth 38 will not register with the notches 37 and, consequently, the member 39 is raised from the gear 21, carrying therewith the arm 46 which operates the trip 49, releasing the shoe 50 which comes into engagement with the support 7, thus the movement of the motor is arrested. If, at the moment when the gear 21 is arrested, the plunger moves upward, the teeth 38 will engage the notches 37, the movement of the wheel 15 will entrain the member 39, thus stressing the yielding member 43 until the plunger 27 disengages the member 39, which will then be restored to its normal position by the yielding member 43. When the plunger 27 returns under the action of the spring 36 it will raise the member 39 and operate the trip 49, as stated. The notch 26 in the collar 22 is sufficiently wide to allow enough angular displacement to the wheel 15 relative to the gear 21 to permit a complete stroke to the plunger 27.

To reset the machine the amplifying arm 52 is raised and swung to the margin of the record. In view of the fact that the gear 21 and the worm wheel 15 have a relative angular displacement, the movement of the amplifying arm to the margin of the disk will rotate therewith the gear 21 until the pin 25 engages the end wall of the notch 26. When the amplifying arm will rotate in the split collar of the gear 51. During the angular displacement of the gear 21 the teeth 38 of the member 39 will be brought into register with the notches 37 of the plunger

27, thus allowing the member 39 to drop, and therewith the arm 46, bringing the trip 49 to its normal position.

To clear the way for the trip, the arm 54 of the shoe must be cleared from the end of the trip. For this purpose the arm 54 has an arcuated extension 55 engageable by an arm 56 participating in the movement of the amplifying arm 52. The arm 56 engages the arcuated extension after said arm has been moved a predetermined distance away from the central part of the disk. This engagement of the arm 56 with the arcuated portion displaces the shoe 50 and clears the way for the trip, which can then be restored to its normal position when the member 39 drops to rest on the gear 21.

In the modified structure the plunger 27' is directly in contact with an arm 46' which is disposed below the housing top 10', the arm 46' being maintained against the plunger 27' by a spring 57. The plunger 27' has a beveled surface 58 which engages a beveled surface 59 provided within the collar of the gear 21. the rotation of the wheel 15' by the worm 14' when the gear 21' is arrested by the engagement of the stylus with the end of the spiral sound groove, causing the inclined plane 58 to travel on the inclined plane 59. The gear 21', being prevented from axial displacement, forces the plunger 27' to move axially and operate the arm 46' which displaces the trip 49'. In the modified structure the plunger 27' is reciprocated only when the wheel 15' runs ahead of the gear 21'. The operation of the two structures is identical, depending on the arrest of the gear 21' while the wheel 15' continues to rotate.

I claim:

1. An automatic stop for talking machines comprising in combination a movable record, a movable amplifying arm, a brake for arresting the movement of the record, a sliding member mounted to revolve and slide when the record is revolved, a second member coupled to revolve with the first so as to have a predetermined angular displacement relative thereto, motion-transmission means from the arm to said second member to synchronize the movement of said second member with the first when said arm is displaced by the record, and motion-transmission means from said second member to the brake becoming operative when the synchronism between the two members is disturbed.

2. An automatic stop for talking machines comprising in combination a movable record, a movable amplifying arm, a brake for the record, a member mounted to revolve motion-transmission means from the record to said member to revolve the same, a second revoluble member coöperatively disposed with the first, motion-transmission means from the arm to said second



member for rotating said second member in synchronism with the first when said arm is displaced by the record, a sliding member associated with one of said revoluble members, means for operating said sliding member when the synchronism between said revoluble member is disturbed, and motion-transmission means from said sliding member to the brake.

3. An automatic stop for talking machines comprising in combination a record mounted to rotate, a movable amplifying arm coöperating with the record, a brake shoe for arresting the movement of the record, a member mounted to revolve, motion-transmission means from the record to said member to revolve the same, a second revoluble member coupled to the first and having relative to the first a predetermined angular displacement, motion-transmission means from the arm to said second member to revolve the member in the same direction and at the same speed as the first member is revolved, tripping means for the brake, and means from one of said members to the tripping means becoming operable when the synchronism between the two revoluble members is disturbed.

4. An automatic stop for talking machines comprising in combination a movable record, a movable amplifying arm coöperating with the record, a brake for the record, a member mounted to revolve, motion-transmission means from the record to said member for revolving the same, a second revoluble member coupled to the first so as to have a predetermined relative angular displacement, motion-transmission means from the arm to said second member to rotate the member in the same direction and speed as the first member when said arm is coöperating with the record, a slide carried by one of said members, slide operating means carried by the other member to displace the slide when the synchronism between the two revoluble members is disturbed, and tripping means from the slide to the brake.

5. An automatic stop for talking machines comprising in combination a movable record, a movable amplifying arm for coöperating with the record, a brake for the record, a member mounted to revolve, motion-transmission means from the record to said member to revolve the same, a second member mounted to revolve with the first and having an angular displacement relative to the first member, motion-transmission means from the arm to said second member for rotating said second member in synchronism with the first when said arm is coöperating with the record, a slide carried by one of said revoluble members, slide-operating means carried by the other of said members in register with the slide, said slide-operating means becoming operative when the synchronism between

the two revoluble members is disturbed, and tripping means connecting the slide with the brake.

6. An automatic stop for talking machines comprising in combination a revoluble record, a movable amplifying arm for coöperating with the record, a brake for the record, a revoluble member, motion-transmission means from the record to said revoluble member, a second revoluble member, motion-transmission means from the arm to the second revoluble member for revolving the said second member in the same direction with the first and at the same speed when said arm coöperates with the record, a plunger in one of said revoluble members constrained to revolve with said member and free to move axially therein, means for moving said plunger axially operable by the motion-transmission means for said revoluble member, a sliding member carried by the other of said revoluble members in register with the plunger, said sliding member being constrained to revolve with said second revoluble member, said plunger and sliding member failing to register when the synchronism between the revoluble member is disturbed, whereby the sliding member is operated by the plunger, and tripping means from the sliding member to the brake.

7. An automatic stop for talking machines comprising in combination a revoluble record, a movable amplifying arm for coöperating with the record, a brake for the record, a revoluble member, motion-transmission means from the record to the revoluble member, a second revoluble member, motion-transmission means from the arm to said second revoluble member to rotate said second member in the same direction as the first and with the same speed when said arm is coöperating with the record, a plunger in one of said revoluble members constrained to rotate therewith, means for actuating the plunger operable from the motion-transmission means for the revoluble member, a sliding member coupled yieldingly to the second revoluble member and maintained in register with the plunger when the two revoluble members are moving in synchronism, said plunger and sliding member failing to register when the synchronism of the two revoluble members is disturbed, whereby the sliding member is operated by the plunger, and tripping means from the sliding member to the brake.

8. An automatic stop for talking machines comprising in combination a revoluble record, a movable amplifying arm for coöperating with the record, a brake for the record, a revoluble member, motion-transmission means from the record to the revoluble member, a second revoluble member, motion-transmission means from the arm to



said second revoluble member to rotate said second member in the same direction and at the same speed as the first member is rotated by the record; a plunger in one of said  
 5 revoluble members constrained to rotate therewith, means for actuating the plunger operable from the motion-transmission means for the revoluble member, a sliding member coupled yieldingly to the second  
 10 revoluble member and retained by said second member in register with the plunger when the two members are moving in synchronism, means coupling the two revoluble members whereby they have a predetermined  
 15 relative angular displacement, tripping means for the brake, and means connecting the tripping means to the sliding member.

9. An automatic stop for talking machines comprising in combination a revoluble  
 20 record, a movable amplifying arm for co-operating with the record, a brake for the record, a revoluble member, motion-transmission means from the record to the revoluble member, a second revoluble member,  
 25 motion-transmission means from the arm to said second revoluble member to rotate said second member in the same direction as the first and with the same speed when said arm is coöperating with the record, friction  
 30 means coupling the motion-transmission means of the second member to the arm, a plunger in one of said revoluble members constrained to rotate therewith, means for actuating the plunger operable from the  
 35 motion-transmission means for said revoluble member, a sliding member coupled yieldingly to the second revoluble member to rotate therewith and maintained in register with the plunger by said second member  
 40 when the two revoluble members are moving in synchronism, tripping means for the brake, and a pivotal arm engaging the tripping means and supported by the sliding member, substantially as and for the purpose set forth.

10. An automatic stop for talking machines comprising in combination a revoluble record, a movable amplifying arm coöperating with the record, a brake for the record, a revoluble member, motion-transmission means from the record to the revoluble member, a second revoluble member, motion-transmission means from the arm to said  
 55 second revoluble member to rotate said second member in the same direction as the first and with the same speed when said arm is coöperating with the record, friction means coupling the motion-transmission means of the second member to the arm, a  
 60 plunger in the first revoluble member constrained to rotate therewith, means for actuating the plunger a number of times for a single revolution of the revoluble member operable from the motion-transmission  
 65 means for the first revoluble member, a slid-

ing member in said second revoluble member, said plunger and sliding member having interengaging means adapted to register when the two members are moved in synchronism, said plunger adapted to displace  
 70 when the synchronism between the two members is disturbed, means coupling yieldingly said sliding member to cause said sliding member to rotate with said second revoluble member, a trip for the brake, and a  
 75 pivotal arm engaging the trip, said arm being supported by the sliding member and adapted to be displaced by said sliding member when said sliding member is displaced by the plunger.

11. An automatic stop for talking machines comprising in combination a revoluble record, a movable amplifying arm, a brake for the record, a revoluble member, motion-transmission means from the record  
 85 to the revoluble member, a second revoluble member, motion-transmission means from the arm to said second revoluble member to rotate said second member in the same direction as the first and with substantially the  
 90 same speed when said arm is moved by the record, a plunger in each of said revoluble members constrained to rotate therewith, means for actuating one of the plungers a number of times for a single revolution of  
 95 the revoluble member in which the plunger is mounted, and tripping means for the brake associated with the other plunger, said plungers having interengaging means registering when the two revoluble members are  
 100 moved in synchronism, the registration of said plungers adapted to be disturbed when the synchronism between the revolving members is disturbed.

12. An automatic stop for talking machines comprising in combination a movable  
 105 record, a movable amplifying arm, a brake for arresting the movement of the record, a pair of coaxial members mounted to slide and revolve, motion-transmission means  
 110 from the record to one of the members, motion-transmission means from the other member to the arm to move said other member in substantially the same direction as the first and at substantially the same speed, said  
 115 members having means adapted to register, and which means leave to said members a relatively angular displacement, means for sliding one of said members, and tripping means for operating the brake associated  
 120 with the other member.

13. An automatic stop for talking machines comprising in combination a revoluble record, a movable amplifying arm, a brake for the record, a member mounted to  
 125 revolve and move longitudinally, motion-transmission means from the record to the member to revolve it and to move it longitudinally, a second member mounted to revolve and slide longitudinally in engagement  
 130

with the first so as to have an angular displacement relative to the first member, motion-transmission means from the arm to said second member to revolve it in the same direction and at substantially the same speed as the first member, and tripping means connecting said second member to said brake for operating the brake by the longitudinal displacement of said first member after said first member has been displaced through an angular distance.

14. An automatic stop for talking machines comprising in combination a plunger mounted to rotate, means for translating and rotating the plunger, a sliding member mounted to revolve in the same direction as the plunger, means for rotating said sliding member in synchronism with the plunger, means coupling the plunger to the sliding member so that a relatively angular displacement may take place between the two, said coupling means causing the translation of

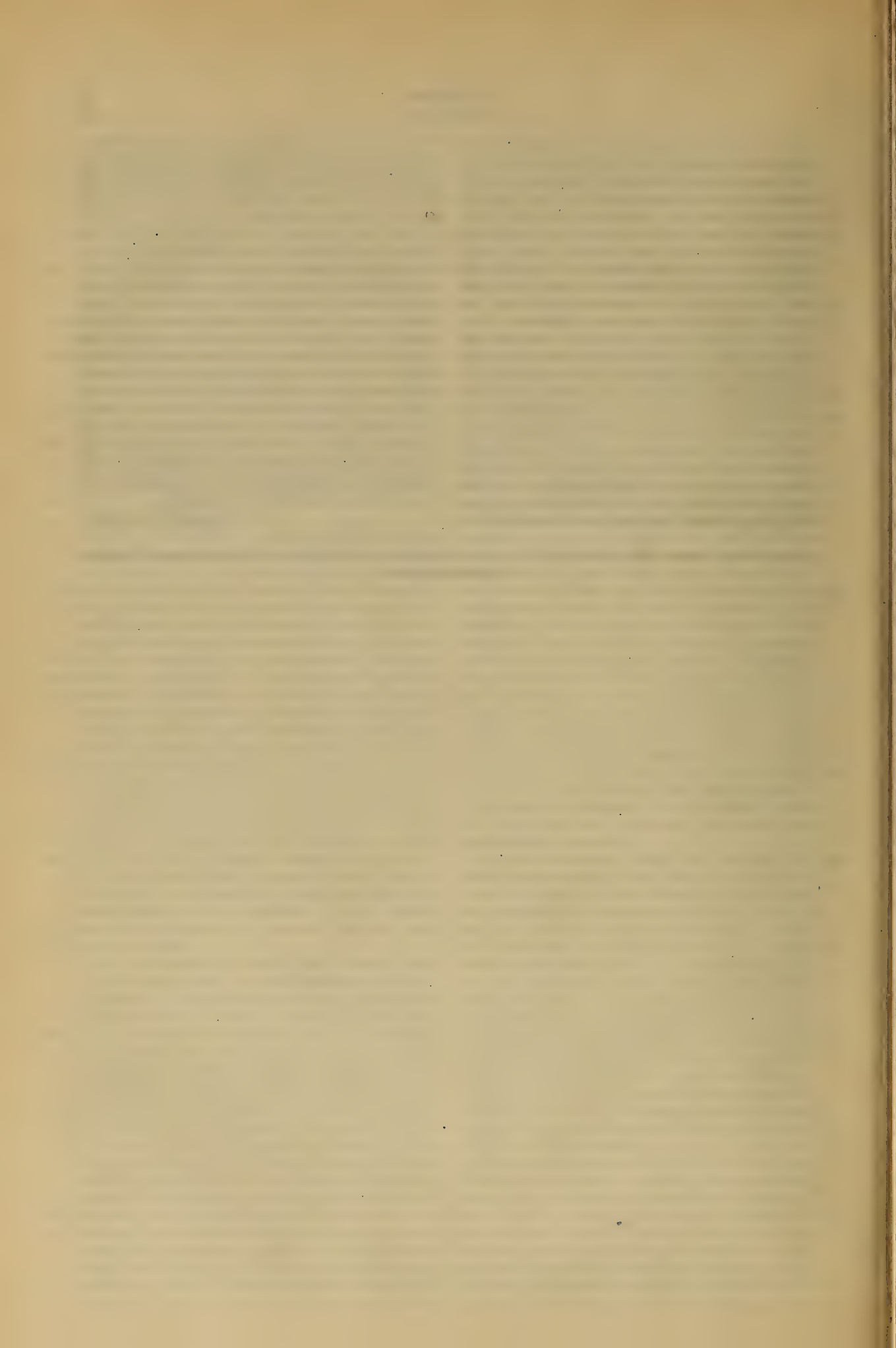
said sliding member by said plunger when the synchronism between the plunger and the sliding member has been disturbed, and tripping means operable by the translation of said sliding member.

15. An automatic stop for talking machines comprising in combination a pair of coaxially disposed members mounted to rotate about the axis and translate longitudinally thereof, means for rotating and translating one of said members, means for rotating only the other of said members in the same direction and at substantially the same speed as the first, coupling means between the two members affording a relatively angular displacement between the two members and adapted to translate the second member by the first when the synchronism in the rotation of the two members is disturbed, and tripping means operable by the translation of the second member.

ANDRÉ JUNOD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





SOUND PRODUCING DEVICE ,

#1,228,639-----E. C. Bayer,

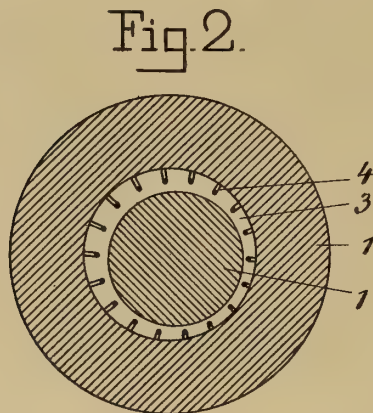
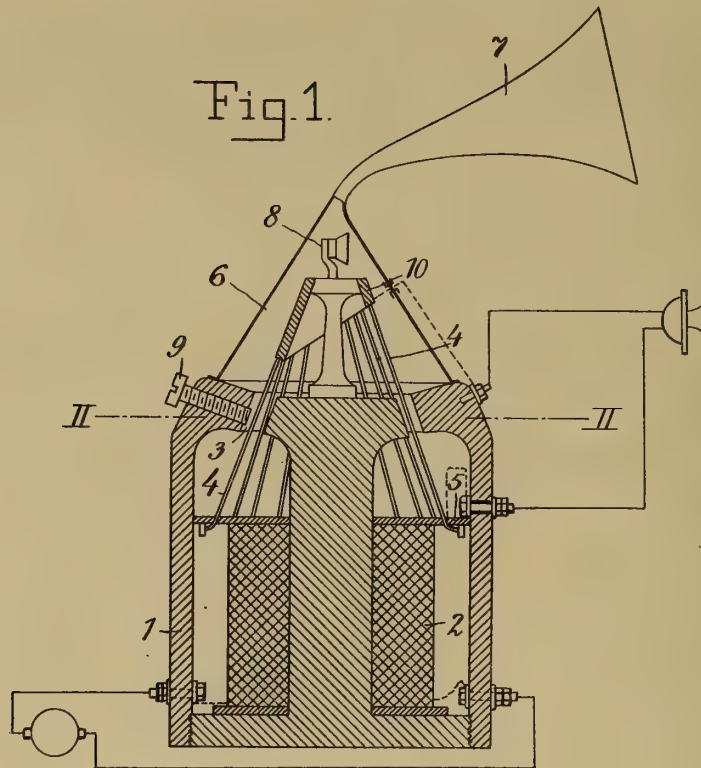
Patented-June 5th, 1917.

Filed-March 27th, 1914.

E. C. BAYER.  
SOUND PRODUCING DEVICE.  
APPLICATION FILED MAR. 27, 1914.

1,228,639.

Patented June 5, 1917.



Witnesses:  
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A. E. Noy.

Inventor  
Eric Christian Bayer,  
By Knight Bros.  
attorneys,



# UNITED STATES PATENT OFFICE.

ERIK CHRISTIAN BAYER, OF JORDLØSE, SVEBØLLE STATION, DENMARK.

## SOUND-PRODUCING DEVICE.

1,228,639.

Specification of Letters Patent.

Patented June 5, 1917.

Application filed March 27, 1914. Serial No. 827,652.

*To all whom it may concern:*

Be it known that I, ERIK CHRISTIAN BAYER, a subject of the King of Denmark, residing at Jordløse, Svebølle Station, Denmark, have invented new and useful Improvements in Sound-Producing Devices, of which the following is a specification.

The present invention relates to a device adapted to transform electrical alternating currents, produced by a telephone-transmitter, into acoustic vibrations. This is attained by a series of tightened wires of non-magnetic material being inserted in the circuit of the telephone-transmitter, their individual rates of vibration being adjusted so as to agree with the various tones corresponding to the number of periods of the alternating current, and the wires crossing a powerful magnetic field, so that any alternating current, depending on its periodicity, will cause one of the wires to vibrate and thus produce the corresponding tone.

On the drawing, Figures 1 and 2 represent one manner of constructing the device, in vertical and horizontal section, respectively.

Referring to the drawing, 1 is the iron frame of a bell-shaped electromagnet with exciting coil 2 and an annular air slot 3. Through the latter a series of wires 4 is strung, their rate of vibration being adjusted for instance at intervals of half a tone from wire to wire so that, practically, all audible tones are represented. The wires are inserted in the circuit, in the telephone line, whose currents are to be transformed, and may be connected in series, in parallel or according to some combined system.

When now a powerful magnetic field is produced in the air slot by means of constant current through the coil 2, then each of the alternating currents, constituting the telephone-current, will cause the wire, corresponding to the periodicity of the current, to vibrate—and only this wire—whereby the wire produces the corresponding tone and, by the common action of all the wires, the entire telephone-current becomes converted into the corresponding tones, the voice, the song, the music, etc. By making the magnetic field 3 very strong, an extremely high intensification of the sound may be attained, and when, as represented in Fig. 1, a resonator 5, a sound-collector 6 and a funnel 7 are provided, the device may be used as a loudly speaking telephone.

The tones produced may also be caused to

act on a microphone 8, whereby the tones are transformed into alternating currents once more, the amplitude being increased, however. The device acts, in this case, as a telephone-relay and, in this respect, it possesses considerable advantages above the devices heretofore known. By the latter, the various tones are increased uniformly, but as the various tones are variously weakened in the cable lines, no intelligible conversation will be attained by intensifying a greatly weakened telephone current in an ordinary telephone relay.

By the above described device, however, it is practicable to intensify the various tones to various extents, according to a definite plan, and this may be effected by giving the magnetic field various strengths opposite the various wires. In Fig. 2 this is shown to be effected by giving the air-slot 3 a varying width at the various places. The magnets may also be fitted with adjustable pole-pieces by which means the width of the air-slot may be regulated. In order to concentrate the field around the wires suitable means, preferably iron screws 9 (Fig. 1) may be attached to the pole-piece.

By the means specified, it becomes practicable to intensify especially those tones which are mostly weakened in the cable lines, and, consequently, a device is attained differing from the heretofore known telephone-relays by not only intensifying the conversation but at the same time making it more intelligible.

In Fig. 1, the microphone 8 is shown to be placed on the common support 10 for the wires 4. The sound-waves, however, may also be transferred to the microphone by way of the air, some fluid, or in any other known manner.

When the wires are placed in the fields of several magnets, the intensity of the various tones may be adjusted by variation of the intensity of the exciting current for the various magnets.

Several of the devices specified may be inserted in one telephone-line, and they may either be concentrated at one single place or distributed, at suitable intervals, along the line.

Besides for the here mentioned use as a telephone relay, the apparatus is very suitable for the reproduction of sounds, such as speech, music, song, etc. When used for such purpose, the apparatus excels by its

ability to omit ("strain out") all impure secondary sounds, for instance when gramophone plates are used, the scratching of the pin on the plate and the foreign sounds produced by the diaphragm, so that the voice, the music, the song, etc., will appear with their original timbre and harmony.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In a sound reproducing device, the combination with a telephone transmitter and its circuit, of a plurality of tightened wires of non-magnetic material adjusted to various tones and all constantly forming integral parts of said circuit, and a powerful magnet producing a field passed through by the said wires.

2. In a sound reproducing device, the combination with a telephone transmitter and its circuit, of a plurality of tightened wires of non-magnetic material arranged in a circle and adjusted to various tones and all constantly forming integral parts of said circuit, and a powerful magnet producing an annular field passed through by the said wires.

3. In a sound reproducing device, the combination with a telephone transmitter and its circuit, of a plurality of tightened wires of non-magnetic material arranged in a circle and adjusted to various tones and all

constantly forming integral parts of said circuit, and a powerful magnet producing an annular field passed through by the said wires and provided with means for adjusting its field intensity in respect of each individual wire.

4. In a sound reproducing device, the combination with a telephone transmitter and its circuit, of a plurality of tightened wires of non-magnetic material arranged in a circle and adjusted to various tones and all constantly forming integral parts of said circuit, and a powerful magnet producing an annular field passed through by the said wires and provided with means for adjusting its field intensity in respect of each individual wire, and a sound collector encircling said wires.

5. In a sound reproducing device responsive to undulating electric currents, the combination of a plurality of tightened wires of non-magnetic material adjusted to various tones and all constantly forming integral parts of a circuit which is adapted to convey said undulating electric currents, and a powerful magnet producing a field passed through by the said wires.

The foregoing specification signed at Copenhagen this 16th day of March, 1914.

ERIK CHRISTIAN BAYER.

In presence of—

CARL FOX MAULE,  
JULIUS LEHMANN.

PROCESS FOR RECORDING SOUND,  
#1,228,901-----Robert L. Gibson,  
Patented-June 5th, 1917.  
Filed-December 29th, 1913.



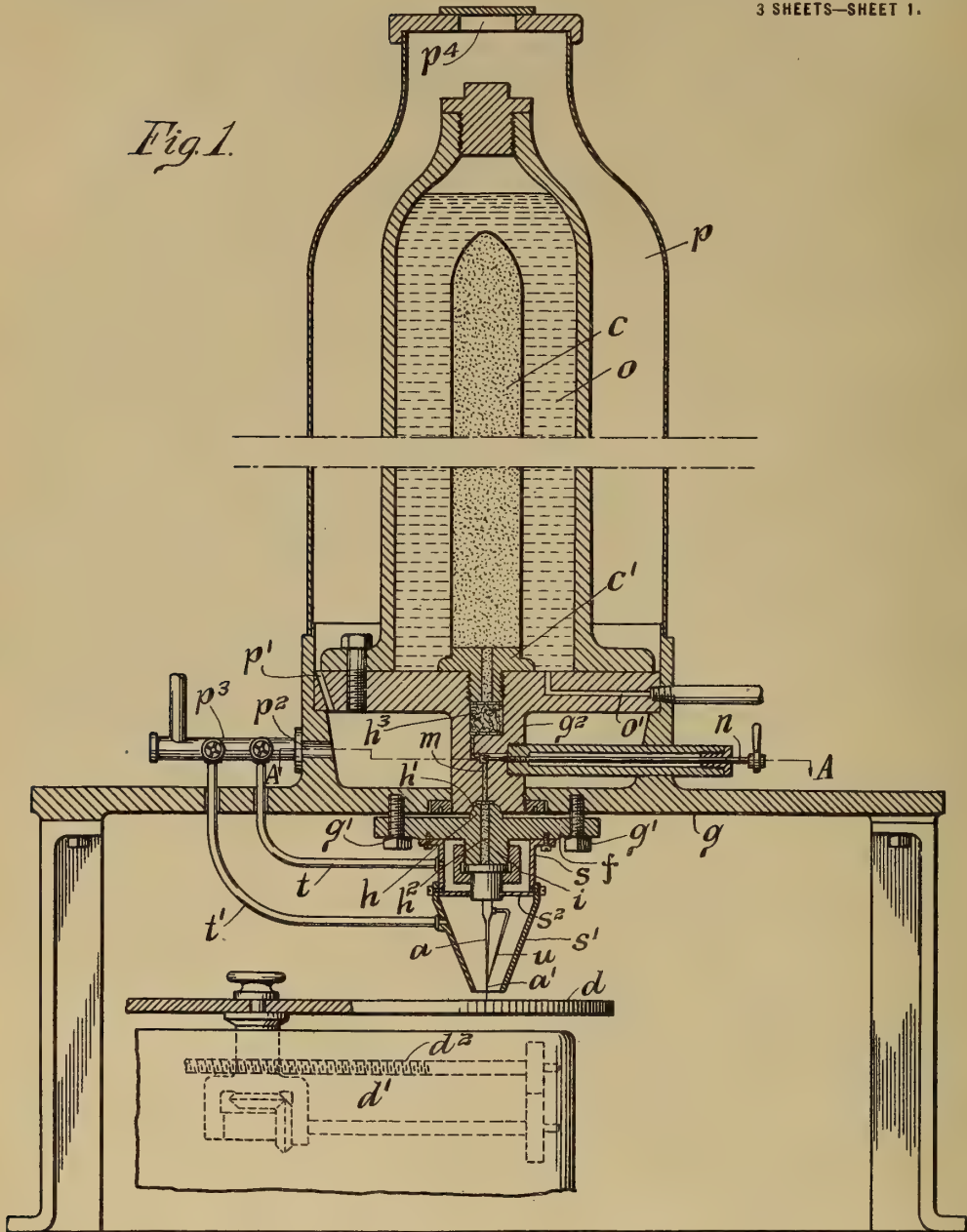
R. L. GIBSON.  
PROCESS FOR RECORDING SOUND.  
APPLICATION FILED DEC. 29, 1913.

1,228,901.

Patented June 5, 1917.

3 SHEETS—SHEET 1.

*Fig. 1.*



WITNESSES:

*J. Stuart Freeman.*  
*Daniel Webster, Jr.*

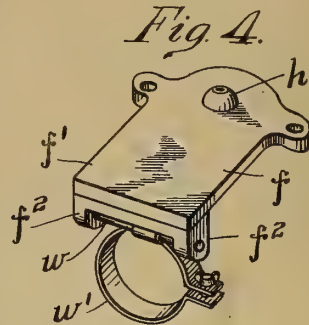
INVENTOR.

*Robert L. Gibson*  
BY *Wm. M. M. M. M.*  
ATTORNEY.

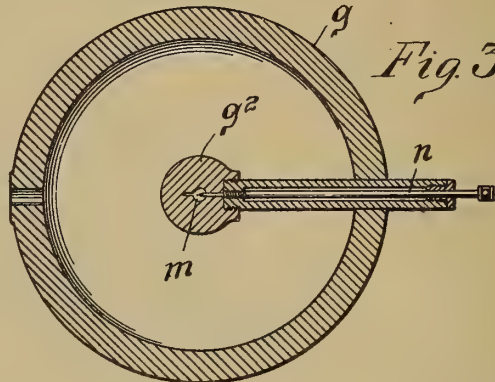


1,228,901.

*Fig. 5.*

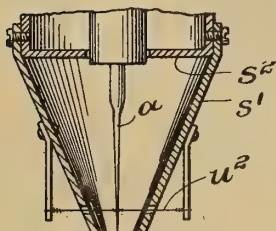


*Fig. 4.*



*Fig. 3.*

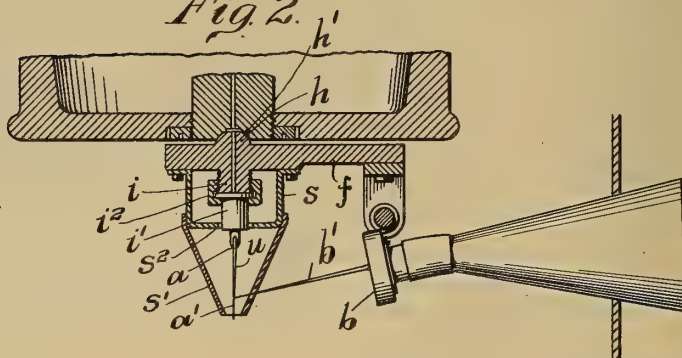
*Fig. 6.*



WITNESSES:

WITNESSES:  
J. Stuart Freeman.  
Daniel Webster, Jr.

*Fig. 2.*



INVENTOR.

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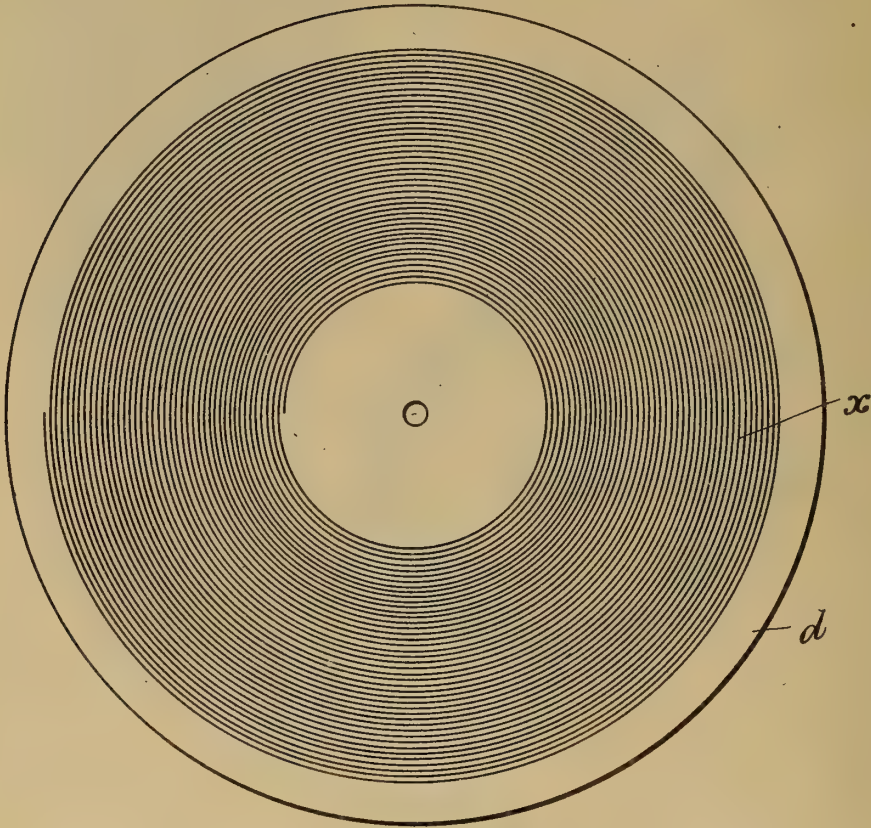


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3 SHEETS—SHEET 3.

*Fig. 7.*



*Fig. 8.*



WITNESSES:

*J. Stuart Freeman.*  
*Daniel Webster, Jr.*

INVENTOR.  
*Robert L. Gibson*  
BY *Messrs. [Signature]*  
ATTORNEY.

# UNITED STATES PATENT OFFICE.

ROBERT L. GIBSON, OF PHILADELPHIA, PENNSYLVANIA.

## PROCESS FOR RECORDING SOUND.

1,228,901.

Specification of Letters Patent.

Patented June 5, 1917.

Application filed December 29, 1913. Serial No. 809,187.

*To all whom it may concern:*

Be it known that I, ROBERT L. GIBSON, a citizen of the United States, and resident of the city and county of Philadelphia and State of Pennsylvania, have invented an Improvement in Processes for Recording Sound, of which the following is a specification.

Heretofore, in the manufacture of gramophone records, namely, those of disk form having a spiral groove in their face for operating a stylus of the sound box, two general methods of manufacture have been employed. The first of these relied upon the etching process, and consisted essentially of floating upon the surface of a polished disk of zinc a thin greasy or waxy coating, such as may be produced by a wax dissolved in gasoline or other solvent, and after subjecting the surface so produced to the stylus of a recording machine vibrated in accordance with sound waves whereby the spiral tracing so formed will expose the zinc, etching the exposed surface to form a spiral groove having lateral undulations which correspond to the tracing of the stylus. The etched disk so produced is then cleaned and subjected to an electroplating operation, such as employed in electrotyping, and an inverse matrix is produced which, after being backed to strengthen it, may be subsequently employed as a die from which to impress in hard rubber or equivalent compounds a record groove which may be used in the reproducing machine, such as the ordinary gramophone. In this manner, duplicates from the master record may be employed in reproducing the sound waves. Great objection, however, has always resulted from the fact that in any etching process, the lateral walls are under-cut owing to the fact that the acid eats laterally as well as vertically, and consequently the records produced under this process have not been considered satisfactory, and the process has been superseded. The second process, and which is that commonly employed at the present time, comprises the following steps: A disk is coated with a waxy compound, such as metallic soap, capable of being engraved, and after being carefully smoothed and leveled, the stylus of the recorder acting as an engraving tool is caused, through the rotation of the disk, to engrave a spiral groove therein of even depth and with lateral undulating side walls. This engraved

disk is then dusted with plumbago and subjected to an electroplating process by which a matrix is produced having a raised spiral upon its surface, the said master matrix, after being backed and strengthened, is in a form capable of being used as a die for reproducing in suitable earthy compounds resembling hard rubber, duplicate records suitable for use in connection with the reproducing machine, such as the ordinary gramophone. Ordinarily, this master matrix is copper, secured by the electroplating process, is not employed as the die because it would soon wear out, and as there would be then no way of securing an accurate duplicate (since the wax engraved disk would have been injured or destroyed), it has been customary after producing the first matrix in copper to employ the same to impress one or more additional wax tablets with the spiral groove lines and to produce "dubbed" matrices from these wax impressions by further electroplating, the "dubbed" matrices so produced being then employed as the dies in the duplicating process employed later on in the commercial manufacture.

In the first process above mentioned, in which etching was employed, it has also been customary to "dub" the matrix as desirable results would not be secured by attempting to use the zinc disk after etching more than in the first instance. In such case, the copper matrix produced from the zinc was employed to produce duplicate dies by "dubbing" operations in which the die was impressed in wax surfaces which were subsequently electroplated, thereby multiplying the defects.

In no case in these prior methods has the copper matrix, produced from the engraved or etched disk, been capable of use with a gramophone instrument as they did not have embodied in their construction a groove to receive the stylus. Moreover, the "dubbing" operations, which have universally been employed, introduced undesirable defects and multiplies existing defects which may have been inherent in the original matrix, into the commercial records which are produced from the "dubbed" dies, and this is important because the very slightest irregularity in the grooves will produce marked defects in the reproduction of sound, as is well known to those skilled in the art.

The object of my invention is to provide a



new method of producing an original sound record or phonogram from which it will be possible to reproduce more nearly perfect commercial records than it has heretofore been possible to manufacture. Generally speaking, the present invention consists in building upon a polished surface of a rotating disk a continuous raised ridge or rib having lateral undulations corresponding to sound waves, which may be used as a mold (directly or indirectly) to form in a plate or disk of suitable material a complementary groove corresponding in general to the groove in an ordinary commercial sound record and adapted for the production of sound in the usual sound reproducing machines.

My invention comprehends the use of a suitable substance which, maintained in a plastic or fluid condition, is forced under pressure through a hollow stylus which is kept in a state of vibration by the recording diaphragm of a recording machine, and which, upon emergence from the stylus, is deposited upon the surface of a revolving plate and there immediately congeals or solidifies to form the rib or ridge above mentioned.

In order that the phonautographic ridges shall be formed free from defects that will prevent the accurate recording and reproduction of sound, including the harmonics and overtones, several factors are important. First, the thread or stream of plastic material should be of substantially less cross-section than the phonautographic ridge formed thereby and the stylus orifice should therefore be exceedingly fine, that is, much finer than the finest orifice through which the material could pass by gravity or by the drawing effect produced by the deposition of the ridge. Second, the material of which the phonautographic ridge is formed shall be one which, by the use of heat, may be maintained fluid until after it emerges from the stylus and will quickly harden upon striking the traveling surface which receives the record. Third, the material shall be subjected to considerable pressure in order to force the same through the stylus orifice. Fourth, the speed of ejection of the material shall be substantially greater than that at which the receiving surface of the revolving plate moves.

It must be appreciated that the factors of size of orifice, pressure, temperature and relation between the speed of ejection of the material and the rate of travel of the receiving plate, are not constant but are variable, more or less, relatively to each other. For example, it is obvious that the smaller the orifice, the higher the pressure required to eject the material and the greater, therefore, the velocity of the minute stream discharged from the stylus relatively to the speed of travel of the moving surface.

In order that those skilled in the art may practise the invention without the necessity of experiment, the following more specific information is given with respect to the more important features of the process.

In the practice of the process I employ a stylus with a discharge orifice of exceedingly minute or microscopic diameter—so minute, indeed, that I have found no practicable way of measuring this orifice. To specify the diameter, if it were possible to do so, would convey no particularly useful information. An explanation of the method of forming the stylus will, however, enable those skilled in the art to carry out the process. It is well known that if a glass tube be heated and then drawn out, the internal and external diameters of the tubes will be reduced proportionately. I take such a glass tube, heat the lower end, and draw it to an exceedingly fine point, which is broken off to expose the microscopic orifice. By drawing a glass tube to an exceedingly fine point as described, the orifice may be much smaller than that of a capillary tube and the stream ejected will be much smaller than the completed ridge.

The material which is forced through the hollow stylus upon the rotating plate is of such consistency and character that, while it will flow at the high temperature and pressure which are maintained, it will immediately solidify and congeal upon the plate to form a raised rib having the lateral undulations imparted by the vibrations of the stylus. Substances that I have found efficient are beeswax or beeswax and paraffin.

The pressure required to eject the material from the stylus with the speed required cannot be defined within very narrow limits, for the obvious reason that it will vary with the character of the material used, the size of the stylus orifice, the temperature and other conditions. Thus, while the orifice in the stylus will be exceedingly minute, when produced in the manner described, it is obvious that there is no way by which the microscopic diameter of the orifice, which cannot be measured, may be accurately predetermined; nor is it at all important that it should be accurately predetermined. But it is clear that the smaller the orifice the greater the speed with which the material must be forced through it in order to build up a sound ridge of the desired dimensions. Here, at once, arises the necessity for adjusting the pressure and temperature (either or both) to the size of the stylus orifice, which is the only not exactly controllable factor. In the practice of my process I have used pressures varying from one to six thousand pounds to the square inch, but it is to be understood that I do not mean to limit myself to the use of any precise pressure, provided it is sufficient to eject the material



employed in a fine-stream through the stylus point to produce the phonautographic ridge. Necessarily, with each stylus made, different pressures must be tested to determine what pressure will suffice to properly force the material through the stylus. After the proper pressure is determined, that pressure may be regularly employed as long as the stylus is in use. The stylus will last indefinitely, in the absence of accident.

The temperature required to maintain the material in a liquefied condition will, of course, vary with the material employed. Whether it is beeswax, or beeswax and paraffin, or some other suitable substance, the temperature required to maintain it liquid is well known in the art and need not be specified. Of course, means should be provided to maintain in a heated condition the stylus and the passageways through which the material passes to prevent it cooling or congealing before it reaches the plate, and a different degree of heat may be imparted to the stylus point. It is also obvious that the temperature may exceed the minimum required and that the higher the temperature the more free the flow, and that the higher the temperature the lower will be the pressure required to insure the proper flow. It will therefore be clearly understood why the temperature and pressure are variable factors which must correlate not only with each other, but with the necessarily variable, and not accurately predeterminable, factor of the size of stylus orifice. Any one skilled in the art can readily regulate the factors of temperature and pressure to suit the particular stylus employed. No more definite information can be furnished, because no more definite knowledge is possessed by me, notwithstanding which I have had no difficulty in successively carrying out the process on an extended scale.

Another important factor in the process is the ejection of the material in less section and volume than is required for the completed ridge, the ridge being formed by a building up of the material upon itself. This is accomplished by the ejection of the fine stream of material from the stylus at a velocity substantially greater than the speed of rotation of the plate on which it is deposited. A very fine stream of material will solidify, congeal or set very quickly, and there is little or no tendency of the stream to spread upon the plate. So far as this feature of the invention is concerned, it is a matter of indifference what the absolute speed of rotation of the plate may be or what may be the absolute section or velocity of the stream emerging from the stylus. Practical commercial considerations, however, imperatively dictate the usual speed of travel of the receiving disk, say about eighty revolutions per minute. There

is, in any event, no occasion to depart from the customary speeds employed to record and reproduce sound.

While, heretofore, it has been proposed, as a first step in the manufacture of sound records, to eject a liquid stream upon a rotating plate, such stream, while of course quite small, was never successfully made fine enough to favorably compare either mechanically or phonetically with the hair-like grooves in the common forms of talking machine records, and, furthermore, said stream, being relatively slow in congealing has always had a tendency to spread or flow after being deposited upon the plate, thus losing the characteristic shape of the individual waves of which it is composed. And again, being coarse and deposited on a surface moving at the same rate of speed as the rate of deposition, that part just ejected from the stylus while at one extreme in its vibratory path, is easily drawn away from its intended position by said stylus as the latter moves to its other extreme position. In other words, the permanent ridge formed of the deposited material does not delicately and minutely conform to the vibrations of the stylus while depositing the same.

In the present invention, however, the ridge of waxy material or its equivalent deposited by the vibrating stylus upon the rotating plate is of spiral form and is in itself a complete and accurate phonautogram, complementary in form and dimensions to the spiral undulatory groove in a sound disk or record used for the reproduction of sound. The record thus produced may be used as a mold for the production of a "master" by electro-deposition, or in any other manner. In my Patent No. 943,631, dated December 14, 1909, there is described a method by which commercial records may be produced from a mold of this general character by electroplating.

According to this method the mold is coated with plumbago and is then plated with copper. The plating thus produced is stripped off carrying with it, to a large extent, the waxy material which forms the raised ridge. The stripping thus produced is cleaned to remove all traces of the waxy material and is then electroplated to produce a die or matrix having a raised ridge identical with that formed by the waxy material deposited originally on the plate. This die may be used for the pressing of records for commercial purposes. It is to be understood, as hereinbefore stated, that my invention is not concerned with the means or manner of producing commercial records from the raised spiral ridge deposited on the surface of the revolving plate, and that other methods than that described may be used for the purpose. If the material composing the ridge has sufficient



strength and rigidity it may be used directly as a die or matrix for pressing records.

In my present process the raised phonautographic ridge is preferably not deposited to its full dimensions at once by the ejection of a proportional quantity of the material forming the ridge from the stylus, but by the gradual deposition of the material in volume less than that of the finished ridge, so that the ridge, by reason of the comparatively retarded rotation of the plate in relation to the velocity of ejection of the material, is built up upon itself to the required size. The great advantage of this method of producing the phonautographic ridge is that the exceedingly small stream of material ejected from the stylus will congeal much more rapidly and retain the undulations imparted by the vibrations of the stylus more perfectly than would be possible with a larger stream, or with a stream of the full size of the line being laid.

Any suitable apparatus may be used for carrying out my process. In the drawings I have shown an apparatus, especially adapted for the purpose, which forms the subject matter of my application 809,188, filed December 29, 1913, and also a stylus, especially adapted for ejecting the exceedingly fine stream of material, which forms the subject matter of my application 809,186, filed December 29, 1913.

Figure 1 is a vertical sectional view of the sound recording apparatus. Fig. 2 is a transverse vertical sectional view of part of the same showing the recording stylus and its supporting frame at right angles to the position shown in Fig. 1; Fig. 3 is a horizontal section on the line A—A of Fig. 1; Fig. 4 is a perspective view of the frame or head which carries the recording stylus; Fig. 5 is a vertical sectional view on an enlarged scale of the recording stylus and the thimble which carries it; Fig. 6 is a view of the stylus and its inclosing casing showing a modification of the means for supporting the stylus against transverse vibration; Fig. 7 is a plan view of a sound-record produced by the apparatus shown; and Fig. 8 is a transverse vertical section of part of the same on an enlarged scale.

A hollow vibratory stylus  $a$  is operated by the impulses transmitted to it by the vibrations imparted by sound waves to the diaphragm of a recording instrument  $b$ . This stylus communicates with a reservoir  $c$  containing the material which forms the raised rib constituting the phonogram which is deposited on the rotating disk or plate  $d$ . The material in a melted state is forced at very high pressure from the reservoir through the stylus upon the surface of the rotating plate  $d$  and forms thereon a spiral line having lateral undulations correspond-

ing with the vibrations imparted to the stylus by the sound waves.

To produce the spiral line the plate  $d$  is rotated by a suitable motor  $d'$  and is simultaneously moved radially by a feed screw  $d^2$  in the manner well known in the production of disk sound records.

The solidified or congealed material when thus deposited forms upon the surface of the plate  $d$  a raised undulatory spiral rib  $w$ . The rib thus formed ordinarily assumes a more or less semi-elliptical final shape as shown in Fig. 8.

The stylus  $a$  may be made of any material which can be provided with a sufficiently small orifice to deposit a stream of the necessary fineness to produce the phonautographic ridge. I prefer to form the stylus from a glass tube having its lower end  $a'$  drawn to a point, as hereinbefore described. The reduced thread-like end of the tube thus produced is connected with the diaphragm of the sound box  $b$  by a filament  $b'$  of glass or other material, and possesses such resiliency that it will readily respond to the vibrations of the diaphragm. The shank  $a^2$  of the glass tube may be left of normal size while the upper portion  $a^3$  is preferably enlarged into a bulb, which is filled with cotton or other suitable straining material  $e$ , through which the melted wax or other substance which forms the ridge passes before it is ejected from the stylus.

The upper end of the stylus communicates with the reservoir  $c$  through a suitable passage or passages controlled by a valve. The stylus is preferably connected with the main-frame  $g$ , which carries the reservoir, by a detachable frame or head  $f$ , and this head also carries the recording sound-box  $b$ .

As shown, the detachable head  $f$  is a plate attached to the main-frame  $g$  by screws  $g'$  and having a spherical head  $h$  adapted to fit a complementary socket  $h'$  in a portion  $g^2$  of the frame  $g$ . The plate  $f$  is provided on the under side with a threaded nipple  $i$ , to which the stylus is attached by a thimble  $i'$  and nut  $i^2$ .

The enlarged or bulbous upper end  $a^3$  of the stylus is contained within the thimble  $i'$  and the shank  $a^2$  extends through an opening  $i^3$  in the bottom of the thimble. Owing to the great delicacy of the stylus it is important that it should not come into direct contact with the metal of the thimble. The opening  $i^3$  through which the shank projects is therefore made slightly larger than the shank and the latter extends through a lead ferrule  $j$  and asbestos washers  $j'$  in the bottom of the thimble which act to support the shank of the stylus but prevent contact with the metal walls of the thimble.

The stylus is introduced through the open top of the thimble and is held in place by a



spring  $k$ . As shown the spring is interposed between a plug  $k'$  screwed into the open end of the thimble and a cap  $k^2$  acting upon the top of the stylus and holding it in place.

5 A washer or washers  $k^3$  of felt or other porous material may be interposed between the cap  $k^2$  and the stylus. The plug and cap  $k'$  and  $k^2$  are provided with passages  $k^4$  and  $k^5$  respectively, through which the melted  
10 material, which forms the phonautographic ridge, is forced from reservoir into and through the stylus.

While my invention is not concerned with the manner of forming and applying the  
15 stylus, I consider the following a simple and convenient manner of forming a stylus suitable for carrying out my process: The glass tube is first blown to produce the bulbous end  $a^3$ ; after the tube is filled with the cotton  
20 or filtering material  $e$  it is introduced in the thimble  $i'$  with the shank projecting through the ferrule  $j$  and washers  $j'$ . The spring  $k$  with the plug  $k'$ , cap  $k^2$  and the washers  $k^3$  are then applied and the plug  $k'$  is screwed  
25 down to fasten the glass tube securely in place. The lower end of the tube is then heated and drawn to form the fine point  $a'$ . As the pressure at the top is applied through the cap  $k^2$  and the felt washers  $k^3$ , and the  
30 contact of the shank at the swelling of the bulbous end is with the soft lead ferrule  $j$ , the glass tube may be firmly secured without fracture, and when it is thus secured the lower end  $a'$  may be drawn in the manner  
35 described to an exceedingly fine point.

The stylus and the thimble  $i'$  which carries it are connected with the nipple  $i$  by the nut  $i^2$ , with the passageways  $k^4$ ,  $k^5$  in communication with a passage  $h^2$  extending  
40 through the thimble and boss of the frame  $f$  and communicating with a passage  $m$  leading through the frame  $g^2$  to the reservoir  $c$ . This passage is controlled by a needle valve  $n$ .

45 The reservoir  $c$  which contains the wax or material of which the ridge is formed preferably consists of an elongated capsule having walls of lead or other flexible material. This is connected by a tubular nut  $c'$  with  
50 the frame  $g^2$  and is inclosed in a chamber  $o$  containing oil, which latter chamber is in turn inclosed in a heating chamber  $p$ . The reservoir  $c$  communicates through the hollow nut  $c'$  with the passage  $m$ , and between  
55 the nut  $c'$  and passage  $m$  is a chamber  $h^3$  containing cotton or other straining material.

The chamber  $o$  communicates by a passage  $o'$  with a pump (not shown) by which  
60 the oil contained in the chamber may be put under very high pressure. This pressure acting on the flexible walls of the reservoir  $c$  compresses them and forces the liquefied wax or other material out through the nut  
65  $c'$  and passageways  $m$  and  $h^2$  to the stylus

from which it is ejected upon the surface of the rotating plate  $d$ . In order that the wax or other material may be forced through the straining substance and ejected in a minute stream from the fine point of the stylus, very  
70 high pressure is required, and this may be conveniently obtained by the pressure of the surrounding body of oil on the flexible walls of the reservoir  $c$ .

Any suitable means may be employed to  
75 maintain the material in a liquefied condition until it is deposited upon the plate  $d$ . I have shown a heating chamber surrounding the oil chamber  $o$  into which hot air or steam may be introduced through passages  
80  $p'$ ,  $p^2$  from a pipe  $p^3$ . The chamber  $p$  may be provided with a relief valve  $p^4$ . The chamber  $p$  forms a heating jacket about the pressure chamber  $o$  from which sufficient  
85 heat is transmitted to liquefy the wax or material in the reservoir  $c$ .

To keep, in a heated condition, the stylus and passageways through which the wax or material forming the ridge passes, I inclose the stylus and connections in a casing to  
90 which heat may be applied. This casing is preferably made in two parts  $s$ ,  $s'$ , the upper part  $s$  inclosing the nipple  $i'$  and the connections of the stylus with it, while the lower part  $s'$  incloses the stylus. These two com-  
95 partments are separated by a partition  $s^2$  and may be heated independently of one another, as by separate pipes  $t$ ,  $t'$  leading from the heating pipe  $p^3$ . Thus a different degree of heat may be applied to the point of  
100 the stylus than is applied to its connection with the head  $f$ .

As the stylus is extremely delicate and responsive to the impulses imparted to it, it is of importance that it should be braced  
105 against lateral or transverse vibration, *i. e.* in a direction transverse to that imparted by the sound waves. For this purpose I prefer to employ an angular strut or brace  $u$  extending from the shank  $a^2$  to the point  $a'$   
110 and arranged at substantially a right angle to the filament  $b'$  by which the sound waves are transmitted from the soundbox  $b$ . This strut or brace may be made of glass. In  
115 Fig. 6 I have shown a modification in which the point of the stylus is connected with a wire or filament  $u^2$  extending transversely through the casing  $s'$  at right angles to the filament  $b'$ .

The particular manner in which the  
120 sound-box is supported and connected with the hollow stylus is not essential to the invention. I prefer, however, when the detachable frame or head  $f$  is used to connect the sound-box with it. To this end I have  
125 shown the frame extended at one side  $f'$  and provided with lugs  $f^2$  by which is carried a transverse pin  $w$  carrying a clamping ring  $w'$  which embraces the sound-box  $b$ .

So far as concerns any subject-matter 130

herein set forth which is also set forth in my prior application, Serial No. 379,712, filed June 14, 1907, this application is a continuation thereof.

5 What I claim is:—

1. The method of forming a record of sound waves which consists in depositing upon a relatively moving surface a stream of fluid which readily solidifies and laterally  
10 vibrating said stream immediately before it strikes said surface to form thereon a ridge having therein lateral undulations corresponding to sound waves.

2. The method of producing a record of sound which consists in depositing upon a relatively moving surface, by a recording member, vibrated by sound waves and maintained out of contact with said surface, an undulatory ridge of approximately uniform  
20 width corresponding to sound vibrations.

3. The method of recording a sound which consists in projecting upon a relatively moving surface a stream of fluid adapted to readily congeal and form on said surface a  
25 ridge and causing sound impulses to vibrate said stream as it approaches said surface to cause said ridge to assume an undulatory form presenting a sound record in distinct relief.

3. 4. The process of forming a permanent sound record which consists in forming an original record by depositing upon a suitable relatively moving surface a substance adapted to maintain itself in a ridge, said

ridge having lateral undulations corresponding to sound waves, and forming a permanent record from said original record. 35

5. The process of recording sound which consists in depositing, while fluid, a readily congealable substance upon a relatively  
40 moving surface, at a velocity substantially exceeding the rate of movement of said surface.

6. The process of recording sound which consists in projecting a stream of fluid upon  
45 a relatively moving surface at a velocity substantially greater than the speed of travel of said surface, and causing sound impulses to vibrate said stream.

7. The process of recording sound which  
50 consists in projecting upon a moving surface a fluid stream of material adapted to readily congeal and of a section substantially less than that of the deposited phonautographic wave, causing sound impulses  
55 to vibrate said stream as it approaches said surface, and imparting to said stream as it approaches said surface a velocity substantially exceeding the speed of travel of said surface, thereby creating a built-up record  
60 in distinct relief of said sound impulses.

In testimony of which invention, I hereunto set my hand.

ROBERT L. GIBSON.

Witnesses:

R. M. KELLY,  
Mrs. H. MAUD WHITE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

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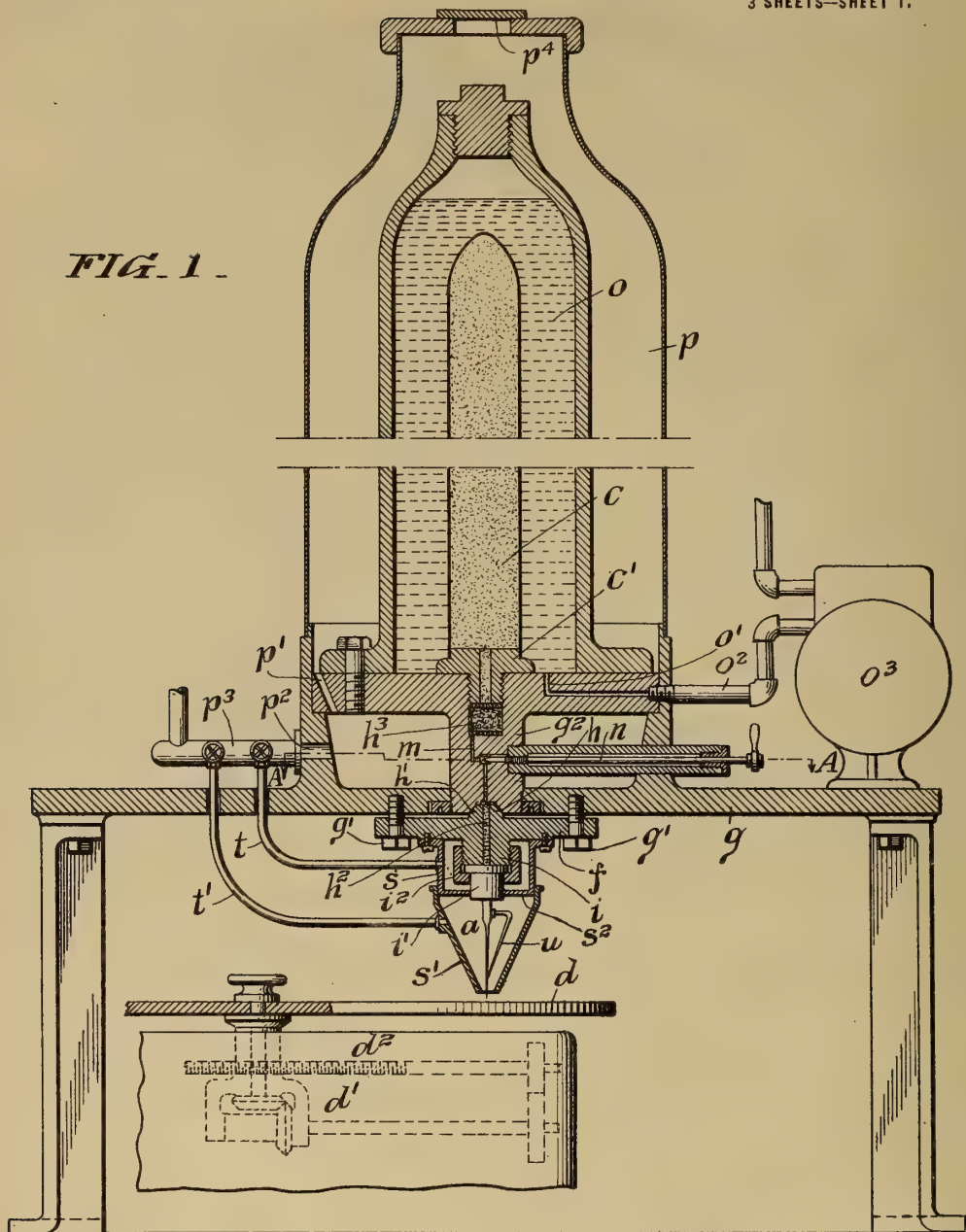


R. L. GIBSON.  
 APPARATUS FOR RECORDING SOUND.  
 APPLICATION FILED DEC. 29, 1913.

1,228,902.

Patented June 5, 1917.  
 3 SHEETS—SHEET 1.

FIG. 1.



Inventor

Witnesses

Daniel Webster, Jr.  
 R. M. Kelly

Robert L. Gibson

By

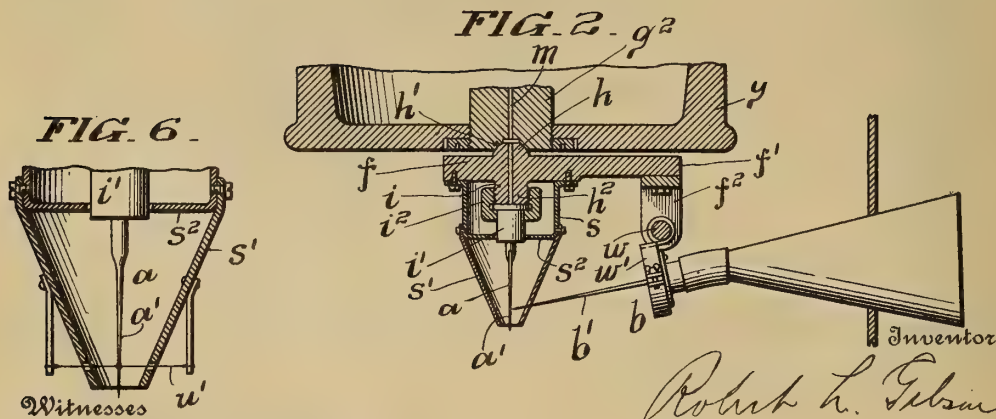
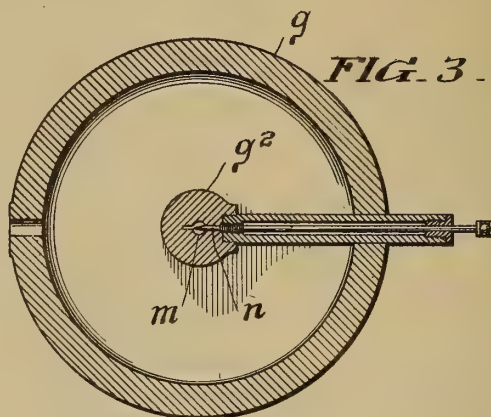
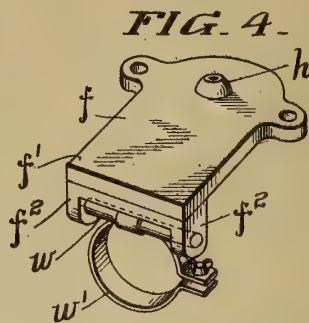
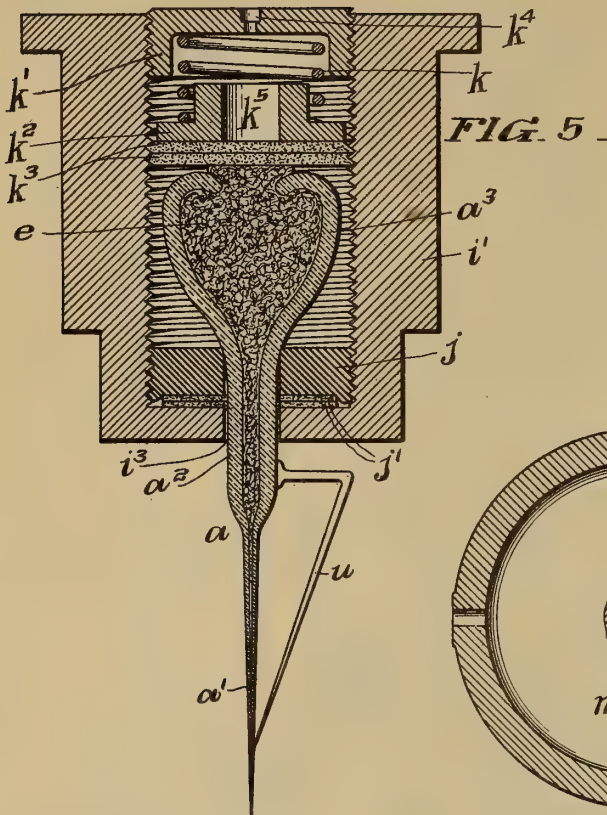
Wm. M. McKim  
 Attorney



R. L. GIBSON.  
 APPARATUS FOR RECORDING SOUND.  
 APPLICATION FILED DEC. 29, 1913.

1,228,902.

Patented June 5, 1917.  
 3 SHEETS—SHEET 2.



Witnesses  
 Daniel Webster, Jr.  
 A. M. Kelly

Inventor  
 Robert L. Gibson  
 By  
 Mrs. M. M. Gibson  
 Attorney





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FIG. 7.

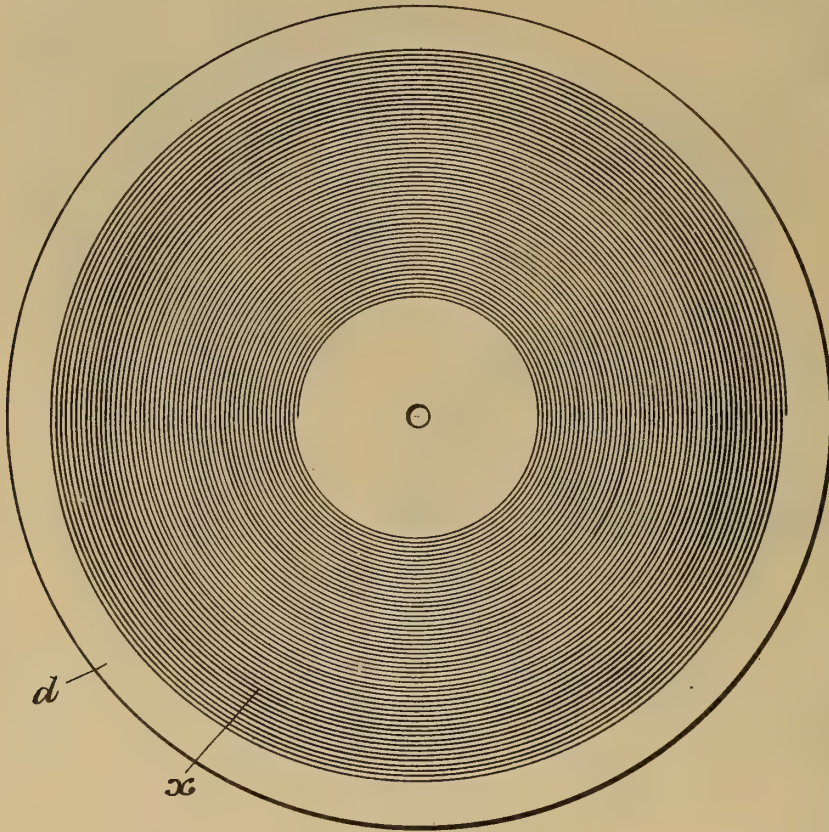


FIG. 8.



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# UNITED STATES PATENT OFFICE.

ROBERT L. GIBSON, OF PHILADELPHIA, PENNSYLVANIA.

APPARATUS FOR RECORDING SOUND.

1,228,902.

Specification of Letters Patent.

Patented June 5, 1917.

Application filed December 29, 1913. Serial No. 809,188.

*To all whom it may concern:*

Be it known that I, ROBERT L. GIBSON, a citizen of the United States, and resident of the city and county of Philadelphia and State of Pennsylvania, have invented an Improvement in Apparatus for Recording Sound, of which the following is a specification.

It is the object of my invention to produce a sound record or phonogram in the form of a raised ridge or rib, which may be used as a mold (directly or indirectly) to form in a plate or disk of suitable material a complementary groove adapted for the production of sound in the usual sound reproducing machines.

In Letters Patent 943,631, dated December 14, 1909, and in my application 379,712, filed June 14, 1907, I have described a process and apparatus for making sound records in this manner, by depositing upon the surface of a revolving plate through a hollow stylus vibrated under the impulse of sound waves a substance capable of forming a raised spiral phonogram.

I have found that a much more perfect phonogram can be produced when the ridge is built up by depositing the material upon itself to the required height instead of being formed by laying a continuous thread or stream upon the surface of the plate. This building up of the ridge is accomplished by forcing the fluid substance of which the ridge is composed, through the vibrating stylus and upon the revolving plate, in an exceedingly minute stream under very high pressure at a speed of ejection substantially greater than that at which the receiving surface of the revolving plate moves. It follows that instead of merely depositing upon the plate a thread or ridge having the same cross section as the orifice of the stylus, the ridge may be built up from an exceedingly minute stream and will have a cross section substantially in excess of that of the orifice through which it is discharged. I have found that when the ridge is thus produced a much more perfect phonogram is obtained than is otherwise possible.

The present invention relates primarily to an apparatus designed for the purpose above described; it also relates to features adapted generally to sound reproducing machines in which the phonogram is produced in the form of a raised ridge by the ejection of

suitable material through a hollow vibratory stylus.

In this application I do not claim the new process herein described as that forms the subject-matter of my application 809,187, filed December 29, 1913.

In the drawings: Figure 1 is a vertical sectional view of a sound recording apparatus embodying the invention; Fig. 2 is a transverse vertical sectional view of part of the same showing the recording stylus and its supporting frame at right angles to the position shown in Fig. 1; Fig. 3 is a horizontal section on the line A—A of Fig. 1; Fig. 4 is a perspective view of the frame or head which carries the recording stylus; Fig. 5 is a vertical sectional view on an enlarged scale of the recording stylus and the thimble which carries it; Fig. 6 is a view of the stylus and its inclosing casing showing a modification of the means for supporting the stylus against transverse vibration; Fig. 7 is a plan view of a sound-record produced by the apparatus shown; and Fig. 8 is a transverse vertical section of part of the same on an enlarged scale.

*a* is a hollow vibratory stylus which is operated by the impulses transmitted to it by the vibrations imparted by sound waves to the diaphragm of a recording instrument *b*.

This stylus communicates with a reservoir *c* containing the material which forms the raised rib constituting the phonogram which is deposited on the rotating disk or plate *d*. The material in a melted state is forced at very high pressure from the reservoir through the stylus upon the surface of the rotating plate *d* and forms thereon a spiral line having lateral undulations corresponding with the vibrations imparted to the stylus by the sound waves.

To produce the spiral line the plate *d* is rotated by a suitable motor *d'* and is simultaneously moved radially by a feed screw *d<sup>2</sup>* in the manner well known in the production of disk sound records.

The material which is forced through the hollow stylus *a* upon the rotating plate *d* to form the raised spiral phonogram is of such consistency and character that, while it will flow at the high temperature and high pressure which are maintained, it will immediately solidify or congeal upon the plate to form thereon a raised rib having the lateral



undulations imparted by the vibrations of the stylus  $a$  through which it is ejected. Any substance having the desired properties may be used, such *e. g.* as bees-wax or bees-wax and paraffin.

The solidified or congealed material when thus deposited forms upon the surface of the plate  $d$  a raised undulatory spiral rib  $x$ . The rib thus formed ordinarily assumes a more or less semi-elliptical final shape as shown in Fig. 8.

Although this rib is extremely small I have found that a much more perfect phonogram will be produced if the material is ejected from the stylus in less volume than is required for the completed ridge, and the ridge is formed by a building up of the material upon itself, that is to say, if the stream of material ejected from the stylus is of less section and volume than the final ridge which it forms, the building up of the ridge to the desired size is effected by the deposition of the fine stream upon itself. This may be accomplished by the ejection of the fine stream of material from the stylus at a velocity greater than the speed of rotation of the plate on which it is deposited. A very fine stream of material will solidify, congeal or set very quickly, and there is little or no tendency of the stream to spread upon the plate.

The stylus  $a$  may be made of any material which can be provided with a sufficiently small orifice to deposit a stream of the necessary fineness to produce the phonographic ridge. I prefer to form the stylus from a glass tube having its lower end  $a'$  drawn to a point. The glass may be drawn to such a fine point that the orifice will be much smaller than that of a capillary tube, and the stream ejected may be much smaller than the completed ridge. The reduced thread-like end of the tube thus produced is connected with the diaphragm of the sound box  $b$  by a filament  $b'$  of glass or other material, and possesses such resiliency that it will readily respond to the vibrations of the diaphragm. The shaft  $a^2$  of the glass tube may be left of normal size while the upper portion  $a^3$  is preferably enlarged into a bulb, which is filled with cotton or other suitable straining material  $e$ , through which the melted wax or other substance which forms the ridge passes before it is ejected from the stylus.

The upper end of the stylus communicates with the reservoir  $c$  through a suitable passage or passages controlled by a valve. The stylus is preferably connected with the main frame  $g$ , which carries the reservoir, by a detachable frame or head  $f$ , and this head also carries the recording sound-box  $b$ .

As shown the detachable head  $f$  is a plate attached to the main-frame  $g$  by screws  $g'$  and having a spherical head  $h$  adapted to fit

a complementary socket  $h'$  in a portion  $g^2$  of the frame  $g$ . The plate  $f$  is provided on the under side with a threaded nipple  $i$ , to which the stylus is attached by a thimble  $i'$  and nut  $i^2$ .

The enlarged or bulbous upper end  $a^3$  of the stylus is contained within the thimble  $i'$  and the shank  $a^2$  extends through an opening  $i^3$  in the bottom of the thimble. Owing to the great delicacy of the stylus it is important that it should not come into direct contact with the metal of the thimble. The opening  $i^3$  through which the shank projects is therefore made slightly larger than the shank and the latter extends through a lead ferrule  $j$  and asbestos washers  $j'$  in the bottom of the thimble which act to support the shank of the stylus but prevent contact with the metal walls of the thimble.

The stylus is introduced through the open top of the thimble and is held in place by a spring  $k$ . As shown the spring is interposed between a plug  $k'$  screwed into the open end of the thimble and a cap  $k^2$  acting upon the top of the stylus and holding it in place. A washer or washers  $k^3$  of felt or other porous material may be interposed between the cap  $k^2$  and the stylus. The plug and cap  $k'$  and  $k^2$  are provided with passages  $k^4$  and  $k^5$  respectively, through which the melted material, which forms the phonographic ridge, is forced from the reservoir into and through the stylus. I do not claim in this application the stylus herein described, as that forms the subject of my application 809,186, filed December 29, 1913.

While my invention is not limited to the manner of forming and applying the stylus, I consider the following the simplest and most convenient manner of carrying out the same: The glass tube is first blown to produce the bulbous end  $a^3$ ; after the tube is filled with the cotton or filtering material  $e$  it is introduced in the thimble  $i'$  with the shank projecting through the ferrule  $j$  and washers  $j'$ . The spring  $k$  with the plug  $k'$ , cap  $k^2$  and the washers  $k^3$  are then applied and the plug  $k'$  is screwed down to fasten the glass tube securely in place. The lower end of the tube is then heated and drawn to form the fine point  $a'$ . As the pressure at the top is applied through the cap  $k^2$  and the felt washers  $k^3$ , and the contact of the shank at the swelling of the bulbous end is with the soft lead ferrule  $j$ , the glass tube may be firmly secured without fracture, and when it is thus secured the lower end  $a'$  may be drawn in the manner described to an exceedingly fine point.

The stylus and the thimble  $i'$  which carries it are connected with the nipple  $i$  by the nut  $i^2$ , with the passageways  $k^4$ ,  $k^5$  in communication with a passage  $h^2$  extending through the thimble and boss of the frame  $f$  and communicating with a passage  $m$  lead-



ing through the frame  $g^2$  to the reservoir  $c$ . This passage is controlled by a needle valve  $n$ .

The reservoir  $c$  which contains the wax or material of which the ridge is formed preferably consists of an elongated capsule having walls of lead or other flexible material. This is connected by a tubular nut  $c'$  with the frame  $g^2$  and is inclosed in a chamber  $o$  containing oil, which latter chamber is in turn inclosed in a heating chamber  $p$ . The reservoir  $c$  communicates through the hollow nut  $c'$  with the passage  $m$ , and between the nut  $c'$  and passage  $m$  is a chamber  $h^3$  containing cotton or other straining material.

The chamber  $o$  communicates by a passage  $o'$  and pipe  $o^2$  with a pump  $o^3$  by which the oil contained in the chamber may be put under very high pressure. This pressure acting on the flexible walls of the reservoir  $c$  compresses them and forces the liquefied wax or other material out through the nut  $c'$  and passageways  $m$  and  $h^2$  to the stylus from which it is ejected upon the surface of the rotating plate  $d$ . In order that the wax or other material may be forced through the straining substance and ejected in a minute stream from the fine point of the stylus, very high pressure is required, and this may be conveniently obtained by the pressure of the surrounding body of oil in the flexible walls of the reservoir  $c$ . The pressure required will vary with the character of the material used, the temperature, the size of orifice of the stylus, the character and amount of the straining material and other considerations.

In the practice of my process I have used pressures varying from one thousand to six thousand pounds to the square inch, but it is to be understood that I do not mean to limit myself to the use of any particular pressure, provided it is sufficient to eject the material employed in a fine stream through the point of the stylus for the purpose of producing the phonautographic ridge.

It is necessary that the material shall be kept in a liquefied condition until it is deposited upon the plate  $d$ . Any suitable means may be employed for this purpose, but I have shown a heating chamber surrounding the oil chamber  $o$  into which hot air or steam may be introduced through passages  $p'$ ,  $p^2$  from a pipe  $p^3$ . The chamber  $p$  may be provided with a relief valve  $p^4$ . The chamber  $p$  forms a heating jacket about the pressure chamber  $o$  from which sufficient heat is transmitted to liquefy the wax or material in the reservoir  $c$ .

It is desirable that the stylus and passageways through which the wax or material forming the ridge passes shall be kept in a heated condition to prevent the cooling and

congealing of the material before it is deposited upon the plate. For this purpose I inclose the stylus and its connections in a casing to which heat may be applied. This casing is preferably made in two parts  $s$ ,  $s'$ , the upper part  $s$  inclosing the nipple  $i'$  and the connections of the stylus with it, while the lower part  $s'$  incloses the stylus. These two compartments are separated by a partition  $s^2$  and may be heated independently of one another, as by separate pipes  $t$ ,  $t'$  leading from the heating pipe  $p^3$ . Thus a different degree of heat may be applied to the point of the stylus than is applied to its connection with the head  $f$ .

As the stylus is extremely delicate and responsive to the impulses imparted to it, it is of importance that it should be braced against lateral or transverse vibration, *i. e.* in a direction transverse to that imparted by the sound waves. For this purpose I prefer to employ an angular strut or brace  $u$  extending from the shank  $a^2$  to the point  $a'$  and arranged at substantially a right angle to the filament  $b'$  by which the sound waves are transmitted from the sound-box  $b$ . This strut or brace may be made of glass. In Fig. 6 I have shown a modification in which the point of the stylus is connected with a wire or filament  $w'$  extending transversely through the casing  $s'$  at right angles to the filament  $b'$ .

The particular manner in which the sound-box is supported and connected with the hollow stylus is not essential to the invention. I prefer, however, when the detachable frame or head  $f$  is used to connect the sound-box with it. To this end I have shown the frame extended at one side  $f'$  and provided with lugs  $f^2$  by which is carried a transverse pin  $w$  carrying a clamping ring  $w'$  which embraces the sound-box  $b$ .

The ridge of waxy material or its equivalent deposited by the vibrating stylus  $a'$  upon the rotating plate  $d$  is of spiral form and is in itself a complete phonautogram, complementary in form and dimensions to the spiral undulatory groove in a sound disk or record used for the reproduction of sound. The record thus produced may be used as a mold for the production of a "master" by electro-deposition, or in any other manner. In my Patent No. 943,631, dated December 14, 1909, there is described a method by which commercial records may be produced from a mold of this general character by electroplating. According to this method the mold is coated with plumbago and is then plated with copper. The plating thus produced is stripped off carrying with it, to a large extent, the waxy material which forms the raised ridge. The stripping thus produced is cleaned to remove all traces of the waxy material and is then electroplated to produce a die or matrix having a raised



ridge identical with that formed by the waxy material deposited originally on the plate *d*. This die may be used for the pressing of records for commercial purposes. It is to be understood that my invention is not concerned with the means or manner of producing commercial records from the raised spiral ridge deposited on the surface of the revolving plate *d*, and that other methods than that described may be used for the purpose. If the material composing the ridge *x* has sufficient strength and rigidity it may be used directly as a die or matrix for pressing records. The essential novelty of my present process is not in the mere laying of a raised phonautographic ridge upon a revolving plate, as that is disclosed in my application 379,712, filed June 14, 1907, but in the laying of a ridge of that kind in such manner that it is not deposited to its full dimensions at once by the ejection of a proportional quantity of the material forming the ridge from the stylus, but by the gradual deposition of the material in volume less than that of the finished ridge, so that the ridge, by reason of the comparatively retarded rotation of the plate *d* in relation to the velocity of ejection of the material, is built up upon itself to the required size. The great advantage of this method of producing the phonautographic ridge is that the extremely small stream of material ejected from the stylus will congeal much more rapidly and retain the undulations imparted by the vibrations of the stylus more perfectly than would be possible with a larger stream, or with a stream of the full size of the line being laid.

What I claim is as follows:

1. In a machine for recording sound, the combination of a stylus formed of a tube drawn to a fine point, thereby presenting a microscopic discharge orifice, means to vibrate the stylus under the influence of sound waves, pressure means to force through the stylus and project through its microscopic discharge orifice a readily solidifying fluid, and a moving member adapted to receive the material ejected from the stylus, thereby forming on said member a ridge having lateral undulations corresponding to sound waves.

2. In a machine for recording sound, the combination of a moving member adapted to receive, as it moves, a readily solidifying fluid, driving means to move said member at a predetermined speed, a hollow stylus having a microscopic discharge orifice of a diameter substantially less than the desired width of the ridge hereinafter specified, means to vibrate the stylus under the influence of sound waves, and pressure means to force said fluid through the stylus at a speed substantially greater than the speed of movement of said moving member, thereby form-

ing on said member a ridge having lateral undulations corresponding to sound waves.

3. In a machine for recording sound, the combination of a moving member, a hollow stylus having a microscopic discharge orifice in operative relation with the moving member, means to vibrate the stylus under the influence of sound waves, a chamber acting as a reservoir for a substance capable of forming a phonautographic ridge and communicating with the bore of the stylus, a straining medium interposed in the path of travel of said substance from the reservoir to the stylus discharge, and pressure means to force said substance from the reservoir through said strainer and out the stylus discharge orifice.

4. In a machine for recording sound, the combination of a hollow vibratory stylus, means to vibrate said stylus under the impulse of sound waves, means to project through said stylus a substance capable of forming a phonautographic ridge and comprising a sealed containing chamber having flexible walls, and a duct connecting said chamber with said stylus.

5. In a machine for recording sound, the combination of a hollow vibratory stylus, means to vibrate said stylus under the impulse of sound waves, means to project through said stylus a substance capable of forming a phonautographic ridge and comprising a sealed containing chamber having flexible walls, a duct connecting said chamber with said stylus, means in said duct to strain said substance, and a valve in said duct to control the flow of said substance therethrough.

6. In a machine for recording sound, the combination of a hollow vibratory stylus, means to vibrate said stylus under the impulse of sound waves, means to project through said stylus a substance capable of forming a phonautographic ridge and comprising a sealed containing chamber having flexible walls, a duct connecting said chamber with said stylus, and means to force said substance from said chamber, through said duct to and through said stylus.

7. In a machine for recording sound, the combination of a hollow vibratory stylus, means to vibrate said stylus under the impulse of sound waves, means to project through said stylus a substance capable of forming a phonautographic ridge and comprising a sealed containing chamber having flexible walls, a duct connecting said chamber with said stylus, and means to force said substance from said chamber, through said duct, to and through said stylus, said last means comprising a chamber surrounding said first chamber, and means to force liquid under pressure into said chamber to compress the flexible walls of said first chamber.



8. In a machine for recording sound, the combination of a hollow vibratory stylus, means to vibrate said stylus under the impulse of sound waves, means to project through said stylus a substance capable of forming a phonautographic ridge and comprising a sealed containing chamber having flexible walls, a duct connecting said chamber with said stylus, and means to force said substance from said chamber, through said duct, to and through said stylus, said last means comprising a chamber surrounding said first chamber, and means to provide a high pressure to compress the flexible walls of said first chamber.

9. In a machine for recording sound, the combination of a hollow vibratory stylus, means to vibrate said stylus under the impulse of sound waves, means to project through said stylus a substance capable of forming a phonautographic ridge and comprising a sealed containing chamber having flexible walls, a duct connecting said chamber with said stylus, means to force said substance from said chamber, through said duct, to and through said stylus, said last means comprising a chamber surrounding said first chamber, and means to force liquid into said chamber under high pressure to compress the flexible walls of said first chamber, and a chamber surrounding said second chamber and adapted to contain a heating medium to heat said liquid and in turn liquefy said substance.

10. In a machine for recording sound, the combination of a hollow vibratory stylus, means to vibrate said stylus under the impulse of sound waves, means to project through said stylus a substance capable of forming a phonautographic ridge and comprising a sealed containing chamber having flexible walls, a duct connecting said chamber with said stylus, means to force said substance from said chamber, through said duct, to and through said stylus, said last means comprising a chamber surrounding said first chamber, and means to force liquid into said chamber under high pressure to compress the flexible walls of said first chamber, a chamber surrounding said second chamber and adapted to contain a heating medium to heat said liquid and in turn liquefy said substance, and a chamber partially inclosing said stylus and adapted to receive a heating medium to maintain said substance in liquid form during its passage therethrough.

11. In a machine for recording sound, the combination of a hollow vibratory stylus, means to vibrate said stylus under the impulse of sound waves, a flexible chamber containing a substance capable of forming a phonautographic ridge, a duct connecting said chamber with said stylus, a chamber surrounding said first chamber and contain-

ing a liquid under pressure, a chamber surrounding said second chamber, an inclosure around said stylus, said last named chamber and said inclosure being adapted to contain a heating medium for liquefying said substance in and during its transit from said first chamber, to and through said stylus, and a moving member to receive the substance ejected by said stylus, moving at a speed less than that at which the substance is ejected from the stylus.

12. In a machine for recording sound, the combination of a hollow vibratory stylus, means to vibrate said stylus under the impulse of sound waves, a flexible chamber containing a substance capable of forming a phonautographic ridge, a duct connecting said chamber with said stylus, a chamber surrounding said first chamber and containing a liquid under pressure, a chamber surrounding said second chamber, an inclosure around said stylus, said last named chamber and said inclosure being adapted to contain a heating medium for liquefying said substance in and during its transit from said first chamber, to and through said stylus, means to regulate the flow of said heating medium into said chamber and said inclosure, and a revolving member to receive the substance ejected by said stylus, revolving at a speed less than that at which the substance is ejected from the stylus.

13. In a machine for recording sound, the combination of a hollow vibratory stylus, means to vibrate said stylus under the impulse of sound waves, means to project through said stylus a substance capable of forming a phonautographic ridge and comprising a container communicating with said stylus and having flexible walls, and means to apply pressure to the flexible walls of the container.

14. In a machine for recording sound, the combination of a hollow vibratory stylus, means to vibrate said stylus under the impulse of sound waves, a container communicating with said stylus for containing a substance capable of forming a phonautographic ridge, and means to apply fluid pressure to the substance in said container to force the same from the container through the stylus.

15. In a machine for recording sound, the combination of a hollow vibratory stylus, means to vibrate said stylus under the impulse of sound waves, a container communicating with said stylus for containing a substance capable of forming a phonautographic ridge, a chamber surrounding said container and containing a fluid, and means to apply pressure to the fluid in said chamber to act upon the substance in the container and force the same from the container through the stylus.

16. In a machine for recording sound, the combination of a hollow vibratory stylus,



means to vibrate said stylus under the impulse of sound waves, a container communicating with said stylus for containing a substance capable of forming a phonautographic ridge, means to apply fluid pressure to the substance in said container to force the same from the container through the stylus, and heating means to maintain the substance in the container in a fluid condition.

17. In a machine for recording sound, the combination of a hollow vibratory stylus, a container communicating with said stylus for containing a substance capable of forming a phonautographic ridge, means to force the substance from the container through the stylus, and means to heat the stylus to maintain the substance in a fluid condition while passing through it.

18. In a machine for recording sound, the combination of a hollow vibratory stylus, a container communicating with said stylus for containing a substance capable of forming a phonautographic ridge, means to force the substance from the container through the stylus, and a protecting casing inclosing said stylus.

19. In a machine for recording sound, the combination of a hollow vibratory stylus, a container communicating with said stylus for containing a substance capable of forming a phonautographic ridge, means to force the substance from the container through the stylus, a protecting casing inclosing said stylus, and means to apply heat to the interior of said casing to maintain the substance for forming the ridge in a fluid condition while passing through the stylus.

20. In a machine for recording sounds, the combination of a container for a substance capable of forming a phonautographic ridge terminating at the bottom in a duct, a detachable frame having a seating portion for making a tight joint with the container and provided with a duct which aligns with the duct of the container, means to clamp the detachable frame to the container without rotating it, a hollow vibratory stylus clamped in position upon the detachable frame at a distance from the container, and means carried by the detachable frame for vibrating the stylus.

21. In a machine for recording sound, the combination of a fixedly supported container for a substance capable of forming a phonautographic ridge, a detachable frame connected with the body of said container and having a duct communicating with the interior of the container and detachable without disturbing the container, means for holding the frame detachably in position, a hollow vibratory stylus detachably secured to the detachable frame and in communication with the duct in said frame, and a diaphragm for vibrating the

stylus secured to and removable with the detachable frame without disturbing the container.

22. In a machine for recording sounds, the combination of a container for containing a substance capable of forming a phonautographic ridge, a diaphragm, a hollow vibratory stylus operated by the diaphragm having its bore communicating with said container, and means to heat said stylus.

23. In a machine for recording sounds, the combination of a container for containing a substance capable of forming a phonautographic ridge, a diaphragm, a hollow vibratory stylus operated by the diaphragm having its bore communicating with said container, and means to heat the point of said stylus.

24. In a machine for recording sound, the combination of a container for a readily solidifying substance capable of forming a phonautographic ridge, a diaphragm, a hollow vibratory stylus operated by the diaphragm and having its bore communicating with the container, and means to heat both the container and the stylus.

25. In a machine for recording sound, the combination of a container for a readily solidifying substance capable of forming a phonautographic ridge, a diaphragm, a hollow vibratory stylus operated by the diaphragm and having its bore communicating with the container, and means to heat the container and also the stylus substantially throughout the latter's length.

26. In a machine for recording sounds, the combination of a container for containing a substance capable of forming a phonautographic ridge, a diaphragm, a hollow vibratory stylus operated by the diaphragm having its bore communicating with said container, and means to independently heat the point and the upper end of said stylus.

27. In a machine for recording sounds, the combination of a container for containing a substance capable of forming a phonautographic ridge and having a discharge duct, a hollow vibratory stylus, a support for the stylus secured to its large non-vibratory end, intermediate detachable connections for connecting the container with the support for the stylus and providing a duct communication between the duct of the container and stylus, and means actuated by sound vibrations for vibrating the stylus.

28. In a machine for recording sounds, the combination of a container for containing a substance capable of forming a phonautographic ridge and having a discharge duct, a diaphragm, a hollow vibratory stylus operated by the diaphragm having its bore in communication with the discharge duct of the container, and a casing inclosing said stylus.

29. In a machine for recording sounds, the combination of a container for containing a substance capable of forming a phonauto-graphic ridge and having a discharge duct,  
5 a diaphragm, a hollow vibratory stylus operated by the diaphragm having its bore in communication with the discharge duct of the container, a casing inclosing said stylus,

and means to supply heat to the interior of said casing.

In testimony of which invention I have hereunto set my hand.

10

ROBERT L. GIBSON.

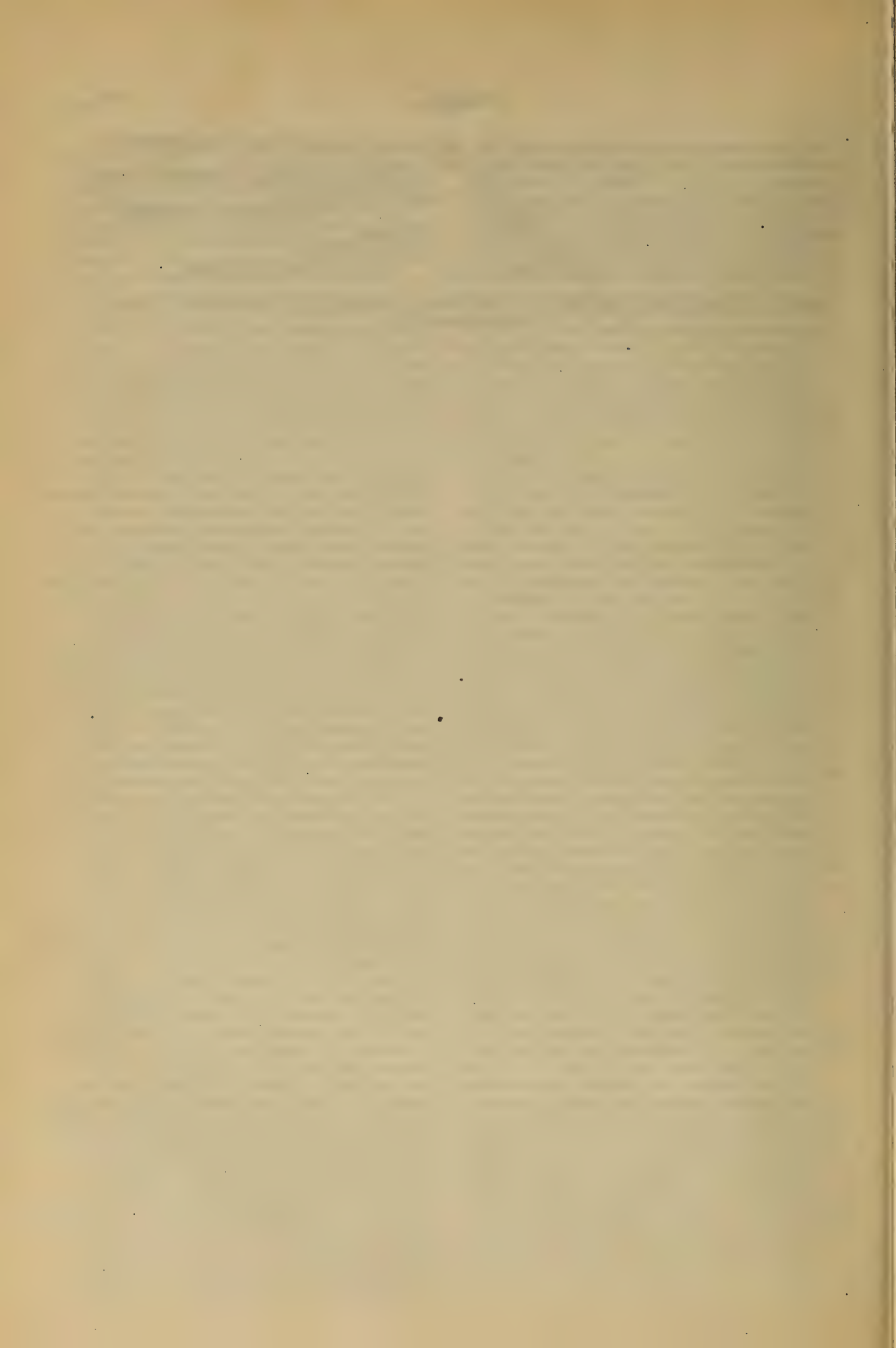
Witnesses:

R. M. KELLY,

ERNEST HOWARD HUNTER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





EDUCATIONAL APPLIANCE,  
#1,229,142-----O. Saenger,  
Patented-June 5th, 1917.  
Filed-August 25th, 1913.

1,229,142.

Patented June 5, 1917.

Fig. 1.

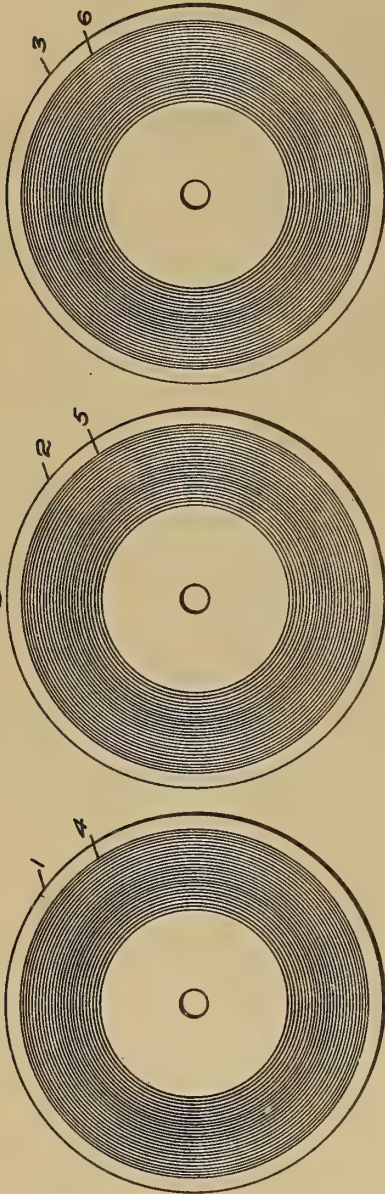


Fig. 2.

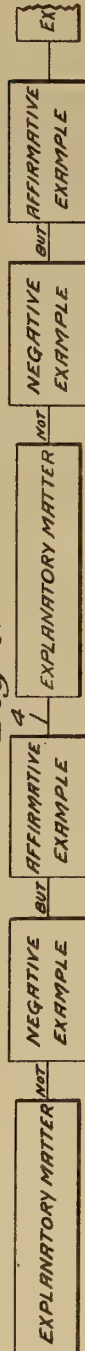


Fig. 3.

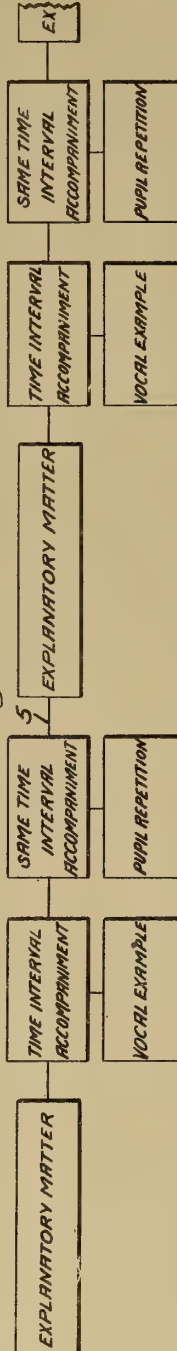
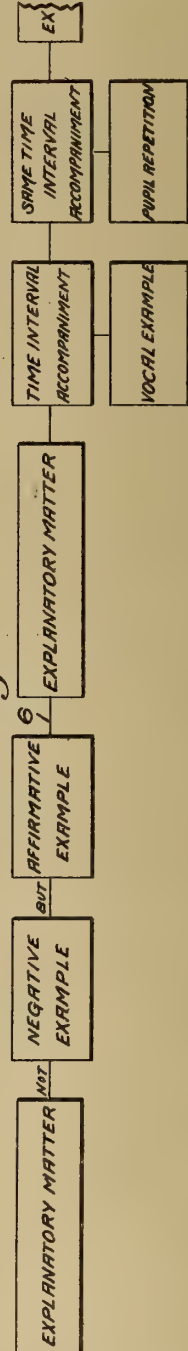


Fig. 4.



Witnesses:  
Horace A. Crossman  
Arthur E. Carson

Inventor:  
Oscar Saenger  
by Mary Arch Janning Marney  
Attys



# UNITED STATES PATENT OFFICE.

OSCAR SAENGER, OF NEW YORK, N. Y.

EDUCATIONAL APPLIANCE.

1,229,142.

Specification of Letters Patent.

Patented June 5, 1917.

Application filed August 25, 1913. Serial No. 786,491.

*To all whom it may concern:*

Be it known that I, OSCAR SAENGER, a citizen of the United States, and a resident of New York city, in the county and State of New York, have invented an Improvement in Educational Appliances, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention consists in improvements in educational appliances, being more particularly intended to assist in vocal teaching through the aid of the phonograph, and to obtain thereby certain results which have heretofore been unattainable by the methods of voice culture commonly in vogue. The object is to provide appliances for carrying out a system of voice culture, whereby a fixed, invariable and unchanging standard of practice may be established and availed of at any time and place, as well by the distant pupil as by the studio pupil.

By means of this invention, not only may the pupil be instructed as to the facts respecting voice culture, but he is presented with certain standardized vocal practice examples actually reproduced and sounded before him, and is given opportunity for, and assistance in, the practice of such examples, similar to that given in the studio. That is to say, the pupil making use of my appliances is not only verbally instructed by the teacher through the use of the phonograph as to facts and conditions pertaining to the particular vocal subject under treatment, but is caused to listen to the correct reproduction by the phonograph of carefully selected illustrative vocal examples, preferably with an instrumental accompaniment of the same, such vocal examples being followed by identical time intervals without the examples, but preferably with the instrumental accompaniment, the pupil being thus given opportunity to fill in such intervals with an attempted reproduction of the vocal examples, and thus to reproduce in contrasted relationship the tone, scale, phrase, or other example, which has been previously sung by an accurately trained voice under precisely the same conditions of time and accompaniment.

Coupled with the verbal instruction contained upon the phonograph record, there may also be provided as required affirmative examples with interposed negative examples, illustrative of the subject of the lecture. That is to say, the record may be made to reproduce a tone, phrase, or other vocal effort, as rendered by the instructor or by some assistant vocalist, first in an incorrect way and illustrating some common fault, and then by contrast in the correct way, so that the pupil has in close contrast and relationship the correct and incorrect methods, and thereby learns to employ the former and avoid the latter.

By the use of sound records such as are hereinafter described, not only is there incorporated in an unchangeable form, which may be duplicated many thousands of times, an invariable and correct standard of vocal practice examples always available to the pupil, but the latter also has an invariable standard practice interval, and also is provided with a standard accompaniment by which he is enabled to practice such standard examples in a comparative or contrasting manner.

The invention will be best understood by reference to the following description, when taken in connection with the accompanying drawings illustrating one specific embodiment thereof, while its scope will be more particularly pointed out in the appended claims.

In the drawings:

Figure 1 represents a series of disk sound records, which may be employed in carrying out my invention;

Fig. 2 represents diagrammatically the character of the sound record presented by one number of the series;

Fig. 3 represents diagrammatically the character of the sound record presented by the second number of the series; and

Fig. 4 is a similar representation of the character of the sound record presented by a third number of the series.

To explain the principles of my system as applied to the requirements of ordinary voice culture, I may describe as an example a related series of sound records which may be employed in giving a course of lessons

corresponding to the customary "quarter" of the vocal instructor,—*i. e.*, a course of twenty lessons.

To equip a pupil with the means for such a course, I provide a related series of twenty phonograph records, or sets of records, each record, or set, as it may be, containing the substance of a lesson or lecture. Each lesson or lecture may be embodied upon a single record, or if the length of a single record does not suffice, then two or more phonograph records constituting a set may be employed to contain the substance of the lecture.

In Fig. 1 of the drawings, I have shown as a matter of illustration, three numbers of such a series of records, it being obvious that any number may be provided which may be necessary to carry out the object of the system.

These records may be made by any desired mechanical process, and upon any suitable recording machine. They may be cylindrical, flat, or of other shape, my system being independent of the type or kind of record, or of the specific mode of manufacture, or the machine upon which they are recorded or reproduced. They may be original records, or may be copies duplicated by any known process, it being only necessary that a sound record of the character herein-after referred to shall be produced by the instructor, or by the instructor and his vocal assistant or assistants, which record is capable of being reproduced at will by the pupil whether the latter be remote or near at hand.

As an illustration of the scope of this system, the first record of the illustrated series referred to, and which will correspond to the first lesson, may be devoted to a general preliminary lecture on singing, either with or without a vocal example such as are hereinafter referred to in connection with subsequent records. The second record or lesson which follows may then give briefly certain features of the usual breathing exercises, each illustrated by such examples as are capable of being reproduced by a sound record, so that the pupil can grasp by the sound of the breathing reproduced on the record what may not be fully grasped in the description.

The third record may then consist of or embody a lecture explanatory of the particular defects which the pupil is in danger of acquiring in his elementary efforts in voice culture, and in this record, I may make use of one of the principles of my invention by interposing the explanatory and descriptive portion of the record with negative and affirmative vocal illustrations of the various features referred to. Thus for example, that portion of the lecture dealing

with tone production may be made to contain examples illustrating some common-fault which the pupil is likely to acquire, and which has been previously explained, such incorrect example being immediately followed by an affirmative example of tone production illustrating the correct method free from such fault. The latter is thereby impressively featured, and brought to the pupil's ear by way of contrast, so that he more readily learns what method to avoid and what method to develop. In a similar manner, other features such as the "attack" may be explained and illustrated, the faulty attack being first given, followed in contrasting relationship by the correct, or faultless attack. All other elementary faults or defects may thus also be impressively explained and illustrated to the pupil.

The third record of the series just described may be diagrammatically represented in Fig. 1, by the record 1 and its sound groove 4, diagrammatically elaborated by the representation in Fig. 2. By this it will be seen that, interspersed with the explanatory matter which is presented by the undulatory sound groove, are the contrasting negative and affirmative examples also presented by the same sound groove. It will be seen that by this method, the original record once made by a skilled and experienced instructor, aided if desired by a trained and accurate vocalist, may be made to establish an unchanging standard, which can be repeated again and again.

Pursuing the same illustrative set of records, the next succeeding, or fourth, record of the series, and which may be represented by 2 in Fig. 1, may deal with the production of single tones, and in this record, as well as in other records of the series, I may make use of another principle or feature of my invention, whereby means are provided for the pupil himself to reproduce a carefully and correctly given vocal example under the same conditions of time and accompaniment. Thus in the illustrative case, in making the original record, the different single notes of the scale may be separately sung, each one with a piano accompaniment but immediately after the singing of each note, there will follow a time interval identically the same as the time interval of the recorded vocal note, and with the same piano accompaniment, but without the vocal note. When the record is reproduced by the pupil, the second time interval gives the latter opportunity to practice the same note with the same accompaniment. In reproducing the record, therefore, the pupil may hear the note correctly sung to a piano or other instrumental accompaniment, and will then immediately thereafter hear the same piano accompaniment, but without the note,



during which interval it will be incumbent on him to sing the same note in close contrasting relationship to the vocal example reproduced by the record, thereby obtaining actual practice closely resembling that had in the actual presence of his instructor. This portion of the record may be produced over and over again by the pupil as often as he desires, until by the process of imitation and comparison, he is enabled to sing the note accurately and correctly. This may then be followed by other illustrative examples, as many as may be required, which serve not only to illustrate the interspersed explanatory matter, but also as exercises to be practised by the pupil.

The sound groove of the 4th record of the illustrated series is diagrammatically represented in Fig. 3. It will be seen that here also, when the record has been carefully and accurately made, there is established an unchanging standard of vocal examples, which are always available either to the studio pupil or the distant pupil, and a series of standard practice intervals and accompaniments.

If it be supposed that the next succeeding record deals with the subject of uniting two tones, the lesson or lecture dealing with the topic may be illustrated in the same way as that previously described by vocal examples of the union of two tones to the piano accompaniment, followed by identically the same interval and the piano accompaniment, but without the voice reproduced by the record, thus permitting the pupil to practice these more advanced vocal examples precisely as if he were present in the studio listening to the voice of the instructor, and under his personal guidance.

The same characteristic practice intervals in the phonograph record may be utilized in connection with a succeeding lecture on the uniting of three tones, another on the uniting of five tones, another on the scale of eighths, on the scale of ninths, and the simple arpeggio, and so on, to the same extent to which the treatment of these subjects requires such practice in the studio itself. All subjects relating to voice culture may be treated by this method, and all exercises necessary to the development of the voice may be had by the method of providing vocal examples with instrumental accompaniment, followed by a similar time interval for the attempted reproduction by the pupil of the same vocal effort.

Similarly, these records may also contain, wherever it is thought desirable by the instructor, the positive and negative examples heretofore referred to, illustrating first the incorrect and then the correct way of performing any given vocal effort. In Fig. 4, I have represented diagrammatically the

subject matter of the sound groove 6 of record 3, which contains explanatory matter interspersed both with the negative and affirmative examples, and the vocal examples coupled with practice intervals.

Preferably, though not necessarily, the original records of the vocal examples described are made with the assistance of singers of reputation and merit, so that each record will not only bring to the pupil the personality of the instructor as presented by the descriptive and explanatory part of the lecture, but also the best obtainable vocal examples, which by incorporation in the sound record are thus unchangeably standardized. In this respect, the system presents advantages over studio instruction, for while the voice from which the vocal examples were originally recorded may undergo unconscious change from time to time, the original record of that voice will be invariable in its reproduction.

It will be observed that the distant pupil, listening to and practising with the vocal instruction record of the character described, may not only receive substantially the same instruction at a distance which he may acquire in the studio of the instructor himself, but is also furnished with an instrumental accompaniment for the practice of his exercises through the phonographic reproduction of the instrumental music which is contained on the phonograph record during the practising interval which follows each vocal example. A student of voice culture may, therefore, continue his studies irrespective of the absence of a piano or other instrument of accompaniment.

It will be understood that courses of instruction and records will be prepared which are suitable for a particular kind of voice to be cultivated,—that is to say, it is within the spirit of my invention to prepare lessons of the type described to suit the tenor voice, others for the soprano voice, and so on.

The courses, or series of lectures or lessons, hereinbefore referred to are merely illustrative of a simple and common use to which my system may be applied. After the pupil has developed at the work of the scale from the use of these records, there may follow the practice of vocalizing under precisely the same conditions,—that is to say, the presentation by the record of an example of vocalizing followed by the same time interval and accompaniment for the reproduction by the pupil.

Next may follow a lecture, or course of lectures, on how to sing a song, the same opportunity for practice being afforded the pupil as heretofore described. If desired, also, these and other records may be interspersed with contrasting examples of the correct and incorrect way of performing any



particular vocal effort. The same principles may be applied in teaching the correct way to sing songs of all descriptions, employing the same methods to show the incorrect way of singing a phrase, followed by the correct way, or incorrect diction or articulation, followed by correct diction or articulation. Similarly, these records may be employed to teach the development of the oratorical style, and the pupil may be taught both by the opportunity for practice afforded by these records, and by the contrasting examples which they contain, difficult passages of oratorios, operatic airs, and arias.

By my invention, a course in voice culture may be embodied in a series of related units, each comprising a record or set of records, each complete in itself yet forming a part of the system by which the voice is to be cultivated. This permits the instructor to prescribe as it were an order of succession in the use of these records, which may be best fitted for the particular voice under cultivation. That is to say, if the voice is found to be weak or faulty in some department or feature, additional practice may be required of the pupil with the record dealing with that fault or feature, or additional records may be supplied the pupil which specialize in the feature in which practice and instruction are required.

While I have illustrated the application of my invention to a course or series of lectures or lessons as exemplified by a related succession of phonograph records, it will be understood that the same may be exemplified in a record which deals with instruction concerning a single subject, such as a single opera, or operatic air or song. Thus, for example, a record or series of records may be employed to explain to the pupil the "Flower Song" of Gounod's "Faust", or any other selected piece, certain difficult parts being explained and illustrated, and certain passages being rendered by vocalists of reputation, which renditions will be followed by time intervals for the attempted reproduction by the pupil.

While I have herein shown and described for the purposes of illustration one specific embodiment of my invention, it is to be understood that the invention is not limited to the device of the construction referred to, or the particular form or arrangement of parts, but these may be modified within wide limits, without departing from the spirit of the invention.

Having thus described my invention, what I claim and desire by Letters Patent to procure is:—

1. An educational appliance, comprising in combination, a predetermined number or series of related sound records bearing a predetermined succession of instructive ex-

amples of vocal production coupled each with instrumental accompaniment, said instructive examples being followed in contrasting relationship by the same time intervals and the same accompaniment alone, thereby to afford opportunity for attempted reproduction by the pupil of each vocal example during the succeeding time interval and with the aid of the succeeding accompaniment.

2. An educational appliance, comprising a sound record bearing one or more instructive examples of vocal production coupled with instrumental accompaniment, said instructive examples being followed in contrasting relationship by the same time interval and the same accompaniment alone, thereby to afford opportunity for attempted reproduction by the pupil of the vocal example during the said second interval and with the aid of the said accompaniment.

3. An educational appliance, comprising in combination a predetermined number or series of related sound records bearing a predetermined succession of instructive examples of vocal production, coupled with instrumental accompaniment, and followed in contrasting relationship by the same time interval and the same accompaniment alone, thereby to afford opportunity for attempted reproduction by the pupil, and presenting also desired affirmative examples with accompanying negative examples also arranged in contrasting relationship.

4. An educational appliance comprising a sound record bearing one or more instructive examples of vocal production coupled with instrumental accompaniment of said instructive examples, being followed in contrasting relationship by the same time interval and the same accompaniment alone, thereby to afford opportunity for attempted reproduction by the pupil of each vocal example, and presenting also one or more affirmative examples coupled with negative examples also in contrasted relationship.

5. An educational appliance comprising a sound record bearing one or more instructive examples of vocal production coupled with instrumental accompaniment, said instructive examples being followed in contrasting relationship by the same time interval but lacking the vocal example, thereby to afford opportunity for attempted reproduction by the pupil of each vocal example during the said second time interval.

6. That method of musical instruction which comprises the following steps, namely, impressing upon a phonograph or other sound record a predetermined succession of instructive examples of vocal production, each coupled with instrumental accompaniment, and following said instructive examples in contrasting relationship by the

same time intervals and the same accompa-  
niment alone, thereby affording opportunity  
for attempted reproduction by the pupil of  
each vocal example during such succeeding  
5 time interval and with the aid of such suc-  
ceeding accompaniment.

In testimony whereof, I have signed my

name to this specification, in the presence of  
two subscribing witnesses.

OSCAR SAENGER.

Witnesses:

JESSE J. HANDY,

FRANK H. THOMAS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."





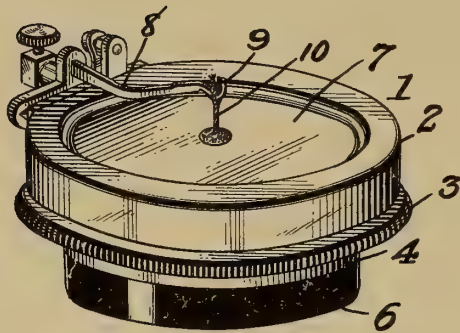
SOUND-BOX FOR PHONOGRAPHS,  
#1,229,197-----Joseph C. Kulp,  
Patented-June 5th, 1917.  
Filed-June 30th, 1916.

J. C. KULP.  
SOUND BOX FOR PHONOGRAPHS.  
APPLICATION FILED JUNE 30, 1916.

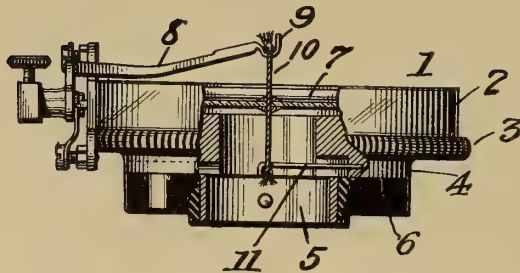
1,229,197.

Patented June 5, 1917.

*Fig. 1.*



*Fig. 2.*



*Inventor:*  
*Joseph C. Kulp*

# UNITED STATES PATENT OFFICE.

JOSEPH C. KULP, OF LINWOOD, NEW JERSEY.

## SOUND-BOX FOR PHONOGRAPHS.

1,229,197.

Specification of Letters Patent.

Patented June 5, 1917.

Application filed June 30, 1916. Serial No. 106,762.

*To all whom it may concern:*

Be it known that I, JOSEPH C. KULP, a citizen of the United States, residing at Linwood, in the county of Atlantic and State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes for Phonographs, of which the following is a specification.

My invention relates to talking machines and more specifically to the construction of the sound box and particularly in means to be used in causing the diaphragm of a phonographic sound box to be vibrated in accordance with the recorded sound waves of the record.

One object of this invention is to provide such a means of vibrating the diaphragm as will eliminate the objectionable "scratchy", metallic or grinding sounds common in instruments of this class.

Another object is to provide such a means of vibrating the diaphragm as will give a clear, full and distinct tone.

A third object is to provide such a means of vibrating the diaphragm as will be sensitive in action, and very simple in construction.

I attain these objects by the mechanism illustrated in the accompanying drawing in which:—

Figure I. illustrates a perspective view of a phonograph sound box showing the exposed parts of my improved vibrating attachment.

Fig. II. illustrates a sectional view through a phonograph sound box equipped with my improved vibrating attachment.

In the drawing the same reference characters represent the same parts throughout. The sound box illustrated in Fig. II comprises a cylindrical casing 1 having a rim section 2 and an end section 3 firmly secured thereto. The end section 3 is provided with a hub portion 4, and a central outlet 5.

To the hub 4 is attached a rubber sleeve 6, the sleeve serving as a means of attachment to the usual tone arm and amplifier (not shown). Supported in the usual manner within the rim 2 of the casing is a diaphragm 7. Connected oscillatably to the rim 2 of the casing is an ordinary stylus bar 8 terminating at the end adjacent the diaphragm in a small hook 9. Attached to the hook is a fine cord 10, the cord passing through, and being securely fastened to, the center of the diaphragm 7. The other end of the cord ex-

tends into the sleeve 6 and is attached to the spring member 11. This spring member may be any suitable resilient means, but in the form shown it is a spring bar rigidly anchored at one end in the sleeve 6 and the other end extends freely into the central part of the sleeve. The cord is connected to this free end.

In assembling the device, the cord is stretched between the spring member and the stylus bar hook, with the cord passing through a small opening in the center of the diaphragm. The cord is shortened until the spring member is under suitable tension or strain. The cord is then fastened securely to the spring member, stylus bar hook, and the diaphragm. In fastening the cord to the diaphragm, any suitable means such as sealing wax may be used.

The cord used may be of any suitable, flexible, non-metallic material, such as a silk, cotton or hemp thread or cord, and this cord is preferably waxed to avoid any changes in it from atmospheric variations.

What I claim as my invention is:—

In a single sound box, the combination of a casing, a diaphragm mounted therein, a stylus bar oscillatably mounted on the casing and with one end extending to one side of and adjacent the diaphragm, a resilient member connected to the casing on the other side of the diaphragm, a flexible non-metallic member connecting the resilient member with the end of the stylus bar adjacent the diaphragm, said flexible member passing through and being fastened to the center of the diaphragm substantially as described.

2. In a single sound box, the combination of a casing, a diaphragm mounted therein, a stylus bar oscillatably mounted on the casing and disposed to one side of the diaphragm, a resilient member connected to the casing and disposed on the other side of the diaphragm, and a flexible means connecting the resilient member and stylus bar, said flexible means passing through, and being fastened to, the center of said diaphragm, substantially as described.

3. In a sound box, the combination of a casing, a diaphragm mounted therein, a stylus bar mounted to oscillate on the casing adjacent the diaphragm, a spring connected to the casing and disposed at the side of the diaphragm opposite to the stylus bar, and a flexible member connecting said spring and stylus bar, said flexible member passing



through, and being fastened to the center of said diaphragm substantially as described.

4. In a sound box, the combination of a casing, a diaphragm mounted therein, a stylus bar mounted to oscillate on the casing, a spring bar rigidly mounted at one end on the casing, and a flexible member connecting the free end of said spring with said stylus bar, said flexible member passing through, and being fastened to, said diaphragm substantially as described.

5. In a sound box, the combination of a casing, a diaphragm mounted therein, a stylus bar mounted to oscillate on the casing, a spring bar rigidly mounted at one end on the casing, and a flexible fibrous member connecting the free end of said stylus bar with the free end of said spring bar, said flexible fibrous member passing through and being fastened to said diaphragm substantially as described.

6. In a sound box, the combination of a casing, a diaphragm mounted therein, a stylus bar mounted to oscillate on the casing, a resilient member rigidly mounted at one end on the casing, and a flexible member connecting the free end of said resilient member with said stylus bar, said flexible member passing through, and being fastened to, said diaphragm substantially as described.

7. In a sound box, the combination of a casing, a diaphragm mounted therein, a stylus bar mounted to oscillate on the casing, a spring rigidly mounted at one end on the casing, and a flexible member connecting the free end of said spring with said stylus bar, said flexible member passing through and being fastened to, said diaphragm.

8. In a sound box, the combination of a casing, a diaphragm mounted therein, a stylus bar mounted to oscillate on the casing, a spring rigidly mounted at one end on the casing, and a flexible non-metallic member connecting the free end of said spring with said stylus bar, said flexible non-metallic member passing through, and being fastened to said diaphragm.

9. In a sound box, the combination of a casing, a diaphragm mounted therein, a stylus bar mounted to oscillate on the casing, a spring bar rigidly mounted at one end on the casing, and a flexible substantially inelastic member connecting the free end of said spring bar with said stylus bar, said flexible member passing through, and being fastened to, said diaphragm.

10. In a sound box, the combination of a

casing, a diaphragm mounted therein, a stylus bar mounted to oscillate on the casing, a spring bar rigidly mounted at one end on the casing, and a flexible cord connecting the free end of said spring bar with said stylus bar, said cord passing through, and being fastened to, said diaphragm.

11. In a sound box, the combination of a casing, a diaphragm mounted therein, a stylus bar mounted to oscillate on the casing, a spring mounted at one end on the casing, and a flexible substantially inelastic member connecting the free end of said spring with said stylus bar, said flexible member passing through, and being fastened to, said diaphragm.

12. In a sound box, the combination of a casing, a diaphragm mounted therein, a stylus bar mounted to oscillate on the casing, a spring rigidly mounted at one end on the casing, and a flexible cord connecting the free end of said spring with said stylus bar, said cord passing through, and being fastened to, said diaphragm.

13. In a single sound box, the combination of a casing, having a tubular member opening therefrom at one side, for connection with a tone arm, a diaphragm mounted in said casing, a stylus bar oscillatably mounted on the casing at the side of the diaphragm opposite to the tubular member, a resilient member in said tubular member and secured at one end thereto, a flexible non-metallic cord connecting said resilient member and stylus bar, said cord passing through and being fastened to said diaphragm.

14. In a single sound box, the combination of a casing having a tubular member opening therefrom at one side for connection with a tone arm, a diaphragm mounted in said casing, a stylus bar oscillatably mounted on the casing at the side of said diaphragm opposite to said tubular member, a spring bar in said tubular member and having one end connected thereto, the other end extending freely into the tubular member, a flexible cord connecting the free end of said spring bar with the stylus bar, said cord passing through, and being fastened to, said diaphragm.

In testimony whereof I affix my signature in the presence of two witnesses.

JOSEPH C. KULP.

Witnesses:

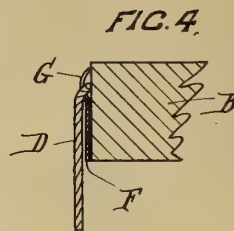
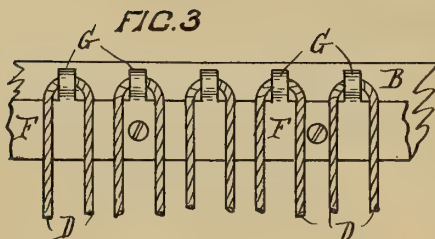
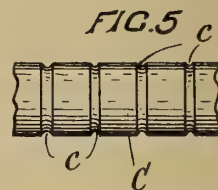
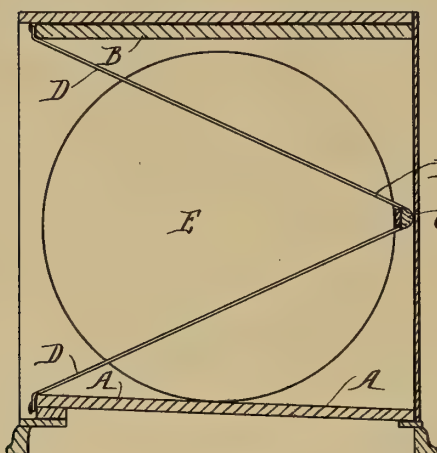
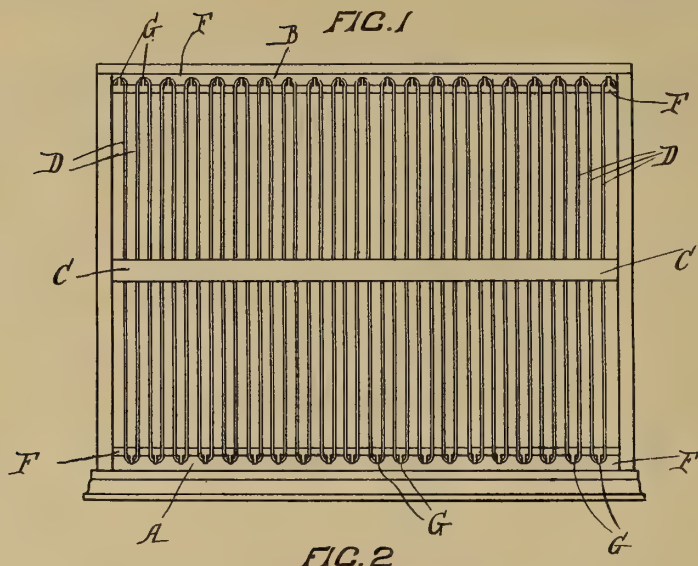
BERTRAM E. WHITMAN,  
 MARIAN F. CAMPBELL.

GRAMOPHONE RECORD HOLDER,  
#1,229,330-----W. J. Sharples,  
Patented-June 12th, 1917.  
Filed-December 11th, 1916.

W. J. SHARPLES.  
GRAMOPHONE RECORD HOLDER.  
APPLICATION FILED DEC. 11, 1916.

1,229,330.

Patented June 12, 1917.



Inventor:  
William Jensen Sharples  
by Arthur H. Sharples  
Att'y.



# UNITED STATES PATENT OFFICE.

WILLIAM JEMSON SHARPLES, OF GISBORNE, NEW ZEALAND.

GRAMOPHONE-RECORD HOLDER.

1,229,330.

Specification of Letters Patent.

Patented June 12, 1917.

Application filed December 11, 1916. Serial No. 136,213.

*To all whom it may concern:*

Be it known that I, WILLIAM JEMSON SHARPLES, subject of the King of Great Britain, residing at 474 Aberdeen road, Gisborne, New Zealand, have invented a new and useful Improved Gramophone-Record Holder; and I do hereby declare the following to be a full, clear, and exact description of the same.

10 This invention relates to an improved construction of holder for storing the disk records of gramophones and other like machines, that has been devised in order to provide for any desired number of the records  
15 being stored in a neat manner within a small compass and so that any particular record may be quickly found and removed for use. The holder is so designed that it may form part of an inclosed cabinet, or may stand  
20 on a shelf or other fixture.

According hereto the holder is formed by a shelf upon which the disk edge is adapted to rest, and side supports formed by flexible cords or wires extending rearward and upward from the front edge of the shelf to  
25 above the back of it and then forward and upward to the front edge of a top board arranged at a height above the shelf such as to allow for the disks passing edge-on between them. The shelf has its surface sloping downward to its rear end, so that when  
30 a disk is placed upon it, the disk will roll to the back of the holder and will be normally retained in position. The flexible cords or  
35 wires are spaced at the proper distances apart to permit of the disks lying between them and, they will by reason of their rearward and forward inclinations, serve to hold the disks upright and at the same time  
40 from coming into surface contact with one another.

The invention is illustrated in the accompanying drawings, in which:—

Figure 1 is a front elevation, and  
45 Fig. 2 a cross sectional elevation of a holder constructed in accordance with this invention.

Fig. 3 is a front elevation, and

50 Fig. 4 a cross sectional elevation, on an enlarged scale, of suitable means for connecting the cords or wires respectively with the shelf and top board of the holder.

Fig. 5 is a back elevation, on an enlarged scale, of the rear bar around which the cords  
55 or wires are passed.

In the drawings a holder formed of a sin-

gle tier is shown, but it will be readily understood that any number of tiers may be arranged within a frame or casing one above the other, or holders may be made in sections adapted to fit into frames or to be built up one upon the other on the well known principle of sectional book cases.

Each holder or section is formed with a bottom shelf A made to slope downward to its back end; a top board B arranged at a height above the shelf sufficient to allow of a disk record being passed between them while held vertically; a rear bar C arranged to extend horizontally along the back of the holder and situated in height about midway between the shelf and the top board, and series of cords or wires D that are arranged to extend from the front edge of the shelf A, rearward around the bar C and then forward to the front edge of the top board B. These cords or wires are arranged in parallel lines extending uniformly at right angles with the front edges of the holder and are arranged at sufficient distances apart to permit of disk records being inserted edge-on between the several cords or wires. The rear bar C is arranged a sufficient distance from the front edge of the holder to allow of the records being completely housed within the holder and its back surface is rounded and formed with grooves *c* (Fig. 5) to receive and properly space the cords or wires.

A record thus placed within the holder will by reason of the rearward downward inclination of the shelf A, roll to the back of the holder and will remain there with its edge resting against the bar C. It will be retained in a vertical position by the cords or wires D between which it is inserted, and which pass across its faces at tangents in the manner shown in Fig. 2, where E represents the record disk. The cords or wires also serve to divide each disk from contact with those on both sides of it.

The front face of the bar C may, if desired, be padded to prevent any damage to the records as they roll back into the holder.

The approved manner of constructing the holder consists in forming all the divisions from a single length of cord or wire, in order that each section may be properly tautened with a minimum of trouble, and also that the whole holder may be made quickly and economically. With such a construction special means have been devised for attaching the

cord respectively to the shelf and top board, such means consisting in a metal bar F that is secured along the front edge of such shelf or top board, as the case may be, and which  
 5 bar is formed with a number of teeth G (Figs. 3 and 4) extending laterally from its outer edge, spaced apart the requisite distances to accord with the spaces between the different divisions of the holder. In forming  
 10 the holder, the one end of the cord or wire is made fast to one end of the top board. The cord or wire is then passed around the first tooth of the bar F, down across the face of the bar, then is carried rearward and  
 15 around the first groove *c* in the rear bar C and then forward and around the first tooth of the bar F on the front of the shelf, again back around the second groove in the rear bar C and forward and around the second  
 20 tooth of the top bar F, and so on continuously to the other end of the holder, where its other end is made fast. The cord or wire is drawn taut as it passes around each tooth G, which is bent out to allow of the cord or  
 25 wire passing behind it, and after this it is bent inward so as to clench the cord or wire and hold it firmly against any loosening. The teeth of the upper bar F will be intermedially spaced with those of the lower bar, as  
 30 shown in Fig. 1 in order that the cord or wire may run from one to the other in true parallel lines.

Each division of the holder may be numbered by numbers arranged along the edge  
 35 of the shelf A and thereby to provide for the proper indexing or cataloguing of the records stored within the holder.

It will be apparent that when the holder

is made with two or more tiers, the top board of each tier may form the shelf of the one  
 40 above it, being given the rearward downward inclination of the shelf.

I claim:—

1. A gramophone disk record holder constructed of a rearwardly and downwardly  
 45 sloping shelf, a top board arranged at a distance above such shelf, a bar fixed about medially between the shelf and top board at the rear of the holder and cords or wires extending in parallel lines from the front edge  
 50 of the shelf around the said bar, and forward to the front edge of the top board, substantially as specified.

2. A gramophone disk record holder constructed with a bottom shelf, a top board arranged at a distance above such shelf, a bar  
 55 fixed medially between the shelf and top board and at the rear of the holder, metal bars secured respectively along the front edges of the said shelf and top board and  
 60 each formed with teeth projecting laterally from its outer edge and spaced at regular intervals apart and a cord or wire extending from the front of the top board rearward around the rear bar and then forward to the  
 65 front of the shelf and looped around the teeth of the respective bars upon the fronts of the said top board and shelf, substantially as specified.

In testimony whereof, I have signed this  
 70 specification in the presence of two subscribing witnesses.

WILLIAM JEMSON SHARPLES.

Witnesses:

W. ALEXANDER,  
 M. E. BROWN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

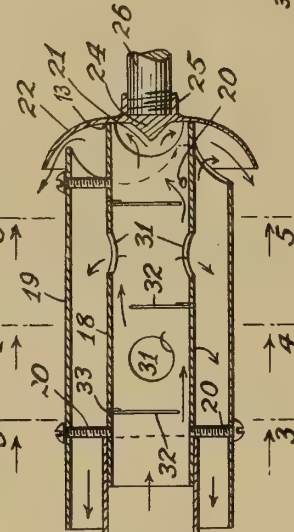
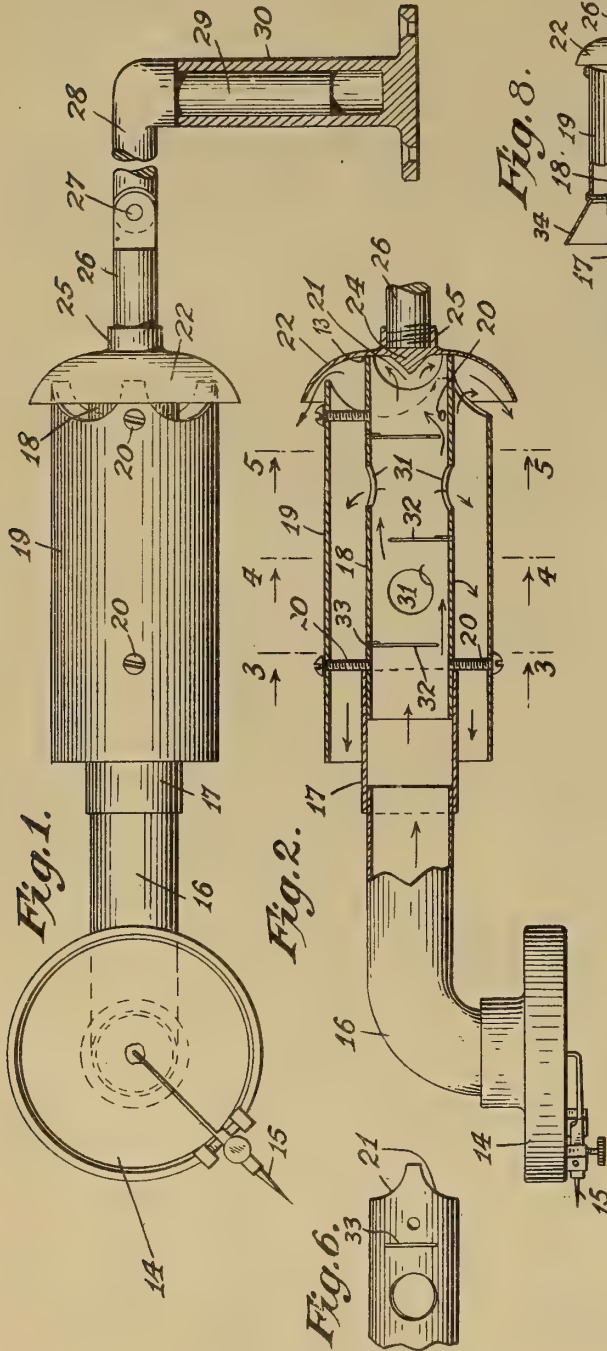
PHONOGRAPH,

#1,229,346-----Reinhold Thomas,  
Patented-June 12th, 1917.  
Filed-November 30th, 1915.

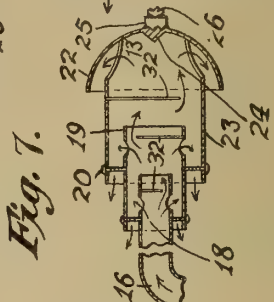
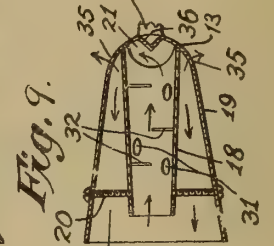
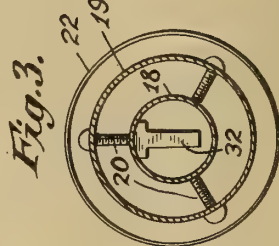
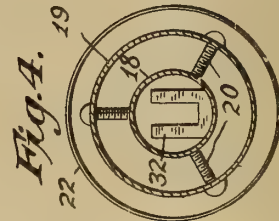
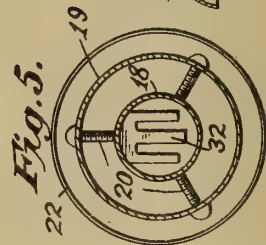
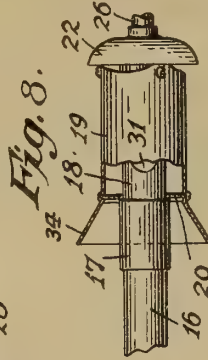


1,229,346.

Patented June 12, 1917.



by



Inventor:  
 Reinhold Thomas  
 by Wm. J. Kent Atty

# UNITED STATES PATENT OFFICE.

REINHOLD THOMAS, OF BROOKLYN, NEW YORK.

## PHONOGRAPH.

1,229,346.

Specification of Letters Patent. Patented June 12, 1917.

Application filed November 30, 1915. Serial No. 64,214.

*To all whom it may concern:*

Be it known that I, REINHOLD THOMAS, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

This invention relates to improvements in tone-projecting or amplifying devices for phonographs, and comprises certain features whereby compactness, lightness and adaptability to various types of phonographs are combined with great accuracy of tone reproduction. The invention includes also a novel means and method for blending and reinforcing tone waves.

The objects of the invention will be in part obvious and in part specifically referred to in the course of the following description of the elements, combinations, arrangements of parts, and applications of principles constituting the invention; and the scope of protection contemplated will appear from the claims.

In the accompanying drawings, which are to be taken as a part of this specification, and in which I have shown merely a preferred form of embodiment of the invention, Figure 1 is a side elevation of a device embodying the invention, with parts broken away and parts in section; Fig. 2 is a view taken at right angles to Fig. 1 and with parts in central longitudinal section; Fig. 3 is a section taken on the line 3—3 of Fig. 2; Fig. 4 is a section taken on the line 4—4 of Fig. 2; Fig. 5 is a section taken on the line 5—5 of Fig. 2; Fig. 6 is an elevation of the end portion of one of the tubes shown in Figs. 1 and 2; Fig. 7 illustrates a modification of the device in which more than two tubes are sleeved one about the other; Fig. 8 is an elevation partly broken away and partly in section illustrating a modification of the device shown in Figs. 1 and 2; Fig. 9 is a central longitudinal section of still another modification.

Referring to the numerals on the drawings, there is shown at 14 an ordinary reproducer or sound box, familiar in the art, and provided with the usual needle 15. 16 indicates a sound-conveying tube upon one end of which the sound box is mounted for pivotal movement in the usual way. In the form of device shown in Figs. 1 and 2 this sound-conveying tube 16 is connected as by means of a coupling-sleeve 17 with

a tubular member 18, and surrounding the tubular member 18, and concentric therewith, is a sleeve 19. Both of these tubes, 18 and 19, are preferably of metal or a suitable resonating material, and they are held in their concentric spaced relation as by means of screws 20, which are threaded through the outside tube or sleeve 19 and make contact with or are threaded into the outside wall of the inner tube 18. There are preferably at least two sets of screws, three to each set, the screws of each set being equally spaced about the circumferences of the tubes, and it is obvious that the proper concentric relation between the tube 18 and sleeve 19 may be readily secured and maintained by manipulation of the screws. Of course other spacing means might be employed, but I prefer those just described because of their simplicity, effectiveness and cheapness.

The outside tube or sleeve 19 is preferably open at both ends, while the inside tube is open at one end for the reception of sound waves coming from the sound-conveying tube 16, while at its other end it is provided with cut-out portions or openings 21, and to this end of the tube 18 there is secured a member 22, which combines the functions of a resonator and of a sound reflector. This member 22 is preferably of the gong shape shown, and of metal, and is arranged concentrically with the tube 18 and sleeve 19 with its concave side toward them, being however, as before stated, secured only to the projecting portions of the inner tube 18, as by soldering or otherwise, as indicated at 13. The reflector member 22 may have its inner central portion formed like a cone indicated by the reference character 24, for the better distribution of the sound waves coming through the inner tube 18, and the central outside face of the reflector member may be provided with a threaded socket 25, for the attachment of a connecting rod 26, which may be connected by a horizontally disposed pivot 27 to one arm 28 of a right angled member, the other or vertical arm of which, indicated by the reference character 29, is intended to seat and pivot within a vertical standard 30, which will be attached at some convenient point on the phonograph.

The inner tube 18 is preferably provided with a number of openings 31, through which the sound waves coming into the tube



18 may pass out into the space between the tube 18 and sleeve 19, as indicated by the arrows. There are also preferably provided within the inner tube 18, though the same provision may of course be made for the outer sleeve 19, a plurality of spring tongues 32 of metal or the like, which are at one end as indicated at 33 secured to the inner tube, as by soldering or otherwise, and have their free ends extending transversely of the inner tube. These spring tongues may have various forms as shown in Figs. 3, 4 and 5, and it is their function to vibrate in harmony with the sound waves passing through the inner tube or the outer tube or both, as the case may be, thereby amplifying and improving the tone of the reproduced sounds. The sound waves pass from the inner tube 18 through the openings 21 and 31, into the space between the inner tube 18 and the sleeve 19, and then pass out at the open left hand end of the sleeve 19, and at the right hand end, between the edge of the sleeve and wall of the reflector 22, said edge or end of the sleeve being preferably spaced away from the reflector. It will of course be understood that I may omit the reflector member 22; that the outside sleeve 19 may extend to the right (referring to Fig. 2) beyond the end of the inner tube 18, and that there may be still another sleeve, 23, surrounding the sleeve 19 concentrically therewith (Fig. 7), in which case the sleeve 19 would preferably be provided with openings like the openings 31. Furthermore, in case I use more than two concentric tubes, each outside tube may extend beyond the end of the tube which it surrounds, (that is, to the right in Fig. 7), so that I will have the effect of a flaring horn; and then a reflector member 22 might be secured to the right hand end of the device, (for instance, to the end of the outside tube 23), so as to reflect the sound waves coming from all of the nested tubes. Where such a plurality of tubes is employed I will preferably use the same means for keeping them in spaced relation, that is, the screws 20.

In Fig. 8 I have shown the outer sleeve 19 provided at its left hand end with a bell or flared portion 34, which will serve somewhat the same function as the reflector 22.

In Fig. 9 there is shown still another modification. In this case the inner tube 18 increases in diameter toward the right, while the outer tube or sleeve 19 is closed at its right hand end, except for apertures 35, and increases in diameter toward its left hand end. Furthermore, the outside tube or sleeve is provided with an attaching portion 36, in the form of a seat in which the end of a connecting rod 26 may be secured as by soldering or otherwise. The inner tube 18 shown in Fig. 11 may be provided with apertures 31 like those shown in Fig. 2 and also

with the spring tongue resonators 32, and the right hand end of the tube 18, where it abuts against and is soldered to the smaller and closed end of the outside member 19, is provided with cut-out portions 21 similar to those shown in Fig. 2. Furthermore, the portion 36 acts in the same way as the cone 24 of Fig. 2 in distributing the sound waves coming through the tube 18.

Inasmuch as many changes could be made in the above construction, and many apparently widely different embodiments of my invention would be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim:

1. In a device of the kind described, a sound-box or reproducer, a sound-conveying tube connected therewith and provided with an opening in its wall, and a second tubular member sleeved about the first and held in spaced relation thereto, both ends of said outside tube being open.

2. In a device of the kind described, a sound box or reproducer, a sound-conveying tube connected thereto having an opening in its wall, a hollow member encompassing said tube and held in spaced relation thereto and open for discharge around the inner tube at the end toward the sound box, and a pivotally movable support for the entire structure.

3. In a device of the kind described, a sound box or reproducer, a sound conveying tube connected thereto and having an opening in its wall, and a hollow member encompassing said tube and held in spaced relation thereto and open for sound discharge around the inner tube at the end toward the sound box, and having at the other end a resonator facing the corresponding end of the inner tube.

4. In a device of the kind described, a sound-box, or reproducer, a sound-conveying tube connected thereto, a second tube sleeved about the first and held in spaced relation thereto, both ends of both tubes being open, and a sound reflector carried by one of said tubes and adapted to reflect the sounds coming from both of the tubes.

5. In a device of the kind described, a sound-box or reproducer, a sound-conveying tube connected thereto, a second tube sleeved about the first and held in spaced relation thereto, both ends of both tubes being open, a sound reflector carried by one of said tubes



and adapted to reflect the sounds coming from both of the tubes, and a pivotally movable support to which said reflector is connected.

5 6. In a device of the kind described, a sound-box or reproducer, a sound-conveying tube connected thereto having an opening in its wall, a second tube sleeved about the first and held in spaced relation thereto, said outside member being open at both ends and being flared at one end.

7. In a device of the kind described, a sound-box or reproducer, a sound-conveying tube connected thereto and having an opening in its wall, a second tube sleeved about the first and held in spaced relation thereto and open for discharge around the inner tube at the end toward the sound box, and a gong-shaped reflector covering the ends of the tubes and supported by one of them.

8. In a device of the kind described, a sound-box or reproducer, a sound-conveying tube connected thereto and having an opening in its wall, a second tube sleeved about the first and held in spaced relation thereto and open for sound discharge around the inner tube at the end toward the sound box, and a gong-shaped reflector overlying both of the tubes and connected to one of them, the ends of both tubes having portions spaced away from the reflector, and a pivotally movable support to which said combination of elements is connected.

9. In a device of the kind described, a sound-box or reproducer, a sound-conveying tube connected thereto and having an opening in its wall, a second tube sleeved about the first and held in spaced relation thereto and open for sound discharge around the inner tube at the end toward the sound box, and a gong-shaped reflector overlying both of the tubes and connected to one of them, the ends of both tubes having portions spaced away from the reflector, and a pivotally movable support to which said gong-shaped reflector is connected.

10. In a device of the kind described, a sound-box or reproducer, a sound-conveying tube connected thereto and having an opening in its wall, a second tube sleeved about the first and held in spaced relation thereto and open for sound discharge around the inner tube at the end toward the sound box, and a gong-shaped reflector overlying both of the tubes and connected to one of them, the ends of both tubes having portions spaced away from the reflector, and a pivotally movable support to which said combination of elements is connected, said gong-shaped reflector having its mouth directed toward said tubes and being arranged concentrically therewith.

11. In a device of the kind described, a sound-box or reproducer, a sound-conveying tube connected thereto and having an opening in its wall, a second tube sleeved about the first and held in spaced relation thereto, and a gong-shaped reflector overlying both of the tubes and connected to one of them, the ends of both tubes having portions spaced away from the reflector, and a pivotally movable support to which said combination of elements is connected, said gong-shaped reflector having its mouth directed toward said tubes and being arranged concentrically therewith, said reflector member having a cone-shaped portion on its inner face centrally thereof.

12. In a device of the kind described, a sound-box or reproducer, a sound-conveying tube connected thereto and having an opening in its wall, a second tube sleeved about the first and held in spaced relation thereto, and a gong-shaped reflector overlying both of the tubes and connected to one of them, the ends of both tubes having portions spaced away from the reflector, said gong-shaped reflector having its mouth directed toward said tubes and being arranged concentrically therewith, said reflector having on its convex face centrally thereof an attaching portion, and a pivotally movable support engaging said attaching portion.

13. In a device of the kind described, a sound box or reproducer, a sound-conveying tube connected thereto, a hollow member encompassing said tube and open around the tube at the end toward the sound box, and means for holding the tube and the encompassing member in spaced relation, comprising screws threaded through the encompassing member and engaging the tube.

14. In a device of the kind described, a sound-box or reproducer, a sound-conveying tube connected thereto, and a second tube sleeved about the first and held in spaced relation thereto and open for sound discharge around the inner tube at the end toward the sound box, the said outside tube extending beyond the inside tube in the direction away from the reproducer.

15. In a sound-reproducing instrument, in combination with a sound conduit consisting of two or more tubes, one within another spaced apart and communicating with each other, a sound box mounted at one end of the innermost of said tubes, the outer tube or tubes being formed for sound discharge at the end toward the sound box, and axially open also at the other end, and a reflector facing and spaced away from the open ends of the tubes remote from the sound box.

In testimony whereof I affix my signature.

REINHOLD THOMAS.



TONE-ARM,

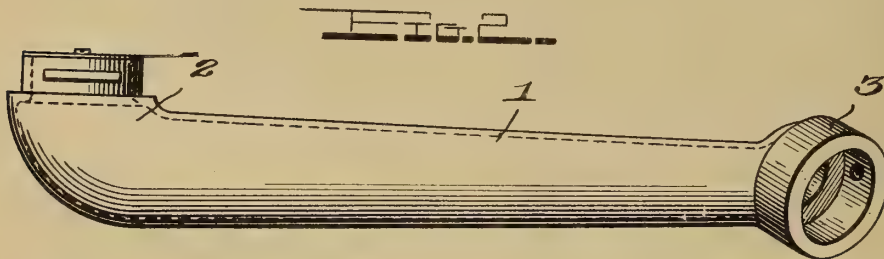
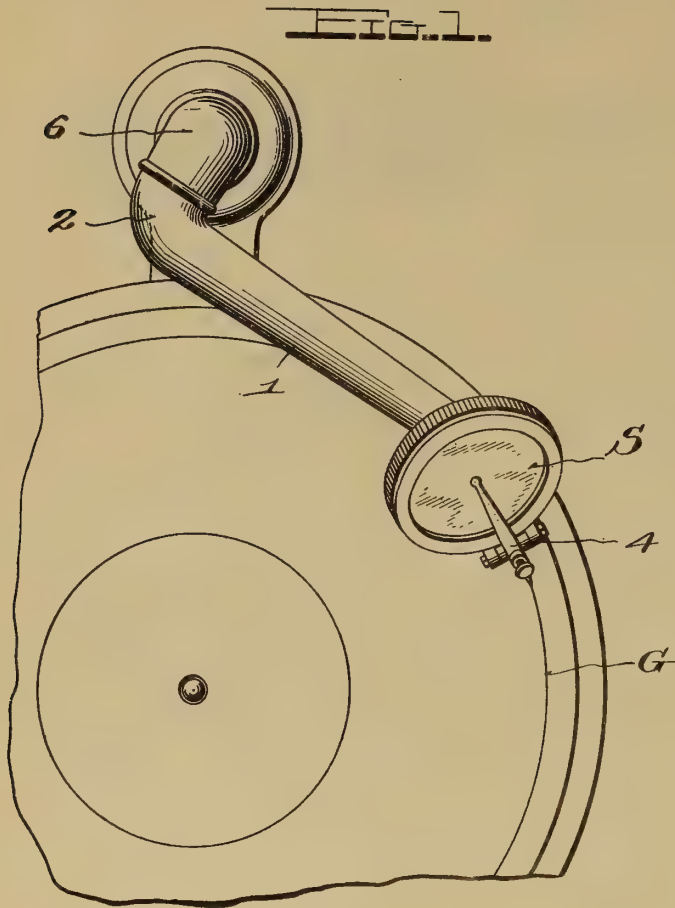
#1,229,466-----Frank W. Hutchings,  
Patented-June 12th, 1917.  
Filed-Jan. 12th, 1916.



F. W. HUTCHINGS.  
TONE ARM.  
APPLICATION FILED JAN. 12, 1916.

1,229,466.

Patented June 12, 1917.



Witness

*Chas. L. Grissbauer.*

*F. W. Hutchings*

Inventor

By

*P. H. Mess.*

Attorney

# UNITED STATES PATENT OFFICE.

FRANK W. HUTCHINGS, OF NEW HAVEN, CONNECTICUT.

## TONE-ARM.

1,229,466.

Specification of Letters Patent. Patented June 12, 1917.

Application filed January 12, 1916. Serial No. 71,670.

*To all whom it may concern:*

Be it known that I, FRANK W. HUTCHINGS, a citizen of the United States, residing at New Haven, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Tone-Arms, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to improvements in tone arms, and pertains more particularly to a tone arm for use in substitution of the usual tone arm of Columbia type of phonographs, which enables the playing therewith of records having hill and dale grooves, as distinguished from lateral record grooves which the Columbia machine is primarily and only designed to play. The usual type of tone arm mentioned is exemplified in the U. S. Patent issued to C. E. Woods, No. 1,108,302, dated August 25, 1914.

The object of the invention is to provide a tone arm which is attachable to the vertical section of the usual tone arm shown in the patent mentioned, and which will enable the playing of records having the commonly termed hill and dale grooves, without in any way changing or modifying the remainder of the structure. In brief, the invention resides in a tone arm which can be readily substituted for the usual tone arm which the Columbia machine is originally equipped with so as to allow the playing of hill and dale groove records.

In the drawings:

Figure 1, is a top plan view of the invention applied to a tone arm of the Columbia type of talking machine; and

Fig. 2 is a plan view of the invention detached.

The tone arm which forms the present invention and which is to be substituted for the tone arm "7" in the patent above identified, is designated 1 and has an elbow 2 formed in the same manner as in the Columbia type, and which is attachable to the offset neck or horizontal elbow 6' of the patent by merely removing the tone arm "7" of the patent, corresponding to arm 1 in the present invention, and in then attaching the usual sound box S to the head 3.

This head has a new and novel disposi-

tion with respect to the tone arm itself and consequently to the record face in that first, the axis of the head forms an acute angle with a vertical plane passing through the main longitudinal axis of the tone arm, and is also inclined to the plane of the record disk. The head also has a disposition so that a plane passed through the axis of the offset head and the stylus bar will be perpendicular to the record face.

The stylus bar 4 is thus mounted in such position that a vertical plane therethrough will be approximately tangential to the record groove G at the point of contact of the stylus point and the groove, which tangential relationship however is less marked when the needle is at the outer circumference of the disk and gradually is accentuated as the center is approached.

With the stylus bar arranged as above described, the point thereof will always be in a position to occupy the center of the record groove to permit of playing of records with the hill and dale grooves, thus enabling the arm forming the present invention, to be substituted for the arm "7" of the patent, to enable hill and dale records to be played on a machine which otherwise is incapable of playing records other than of the lateral type.

What is claimed is:

1. A tone arm of the Columbia type with offset neck, having a sound box carrying head, at one end thereof, the axis of said head forming an acute angle with a vertical plane passing through the main longitudinal axis of the tone arm.

2. A tone arm of the Columbia type with offset neck, having a sound box carrying head at one end thereof, the axis of said head forming an acute angle with a vertical plane passing through the main longitudinal axis of the tone arm, and also being inclined to the plane of the record disk.

3. A tone arm of the Columbia type with offset neck, having a sound box carrying head at one end thereof, the axis of said head forming an acute angle with a vertical plane passing through the main longitudinal axis of the tone arm, and also being inclined to the plane of the record disk, and the sound box being mounted on the head

so that a plane passed through the axis of the offset head and the stylus bar will be perpendicular to the record face.

4. An attachment for tone arms of the  
5 Columbia type, comprising a main tone arm member, and a sound box mounted thereon in such a position that a vertical plane

through the stylus bar will be tangent to the record groove at the point of contact of the stylus point and groove.

In testimony whereof I have hereunto affixed my signature.

10

FRANK W. HUTCHINGS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

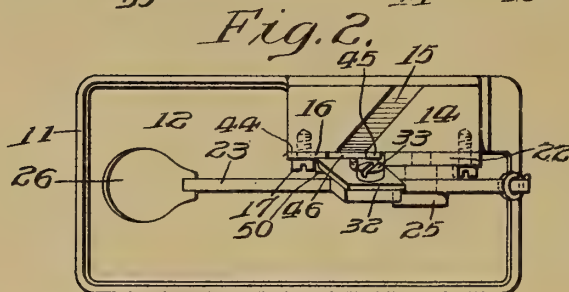
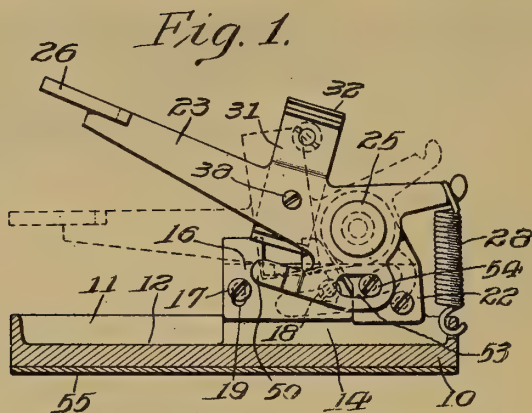


CUTTER FOR SOUND REPRODUCING STYLI,  
#1,229,469-----E. R. Johnson,  
Patented-June 12th, 1917.  
Filed-November 18th, 1912.

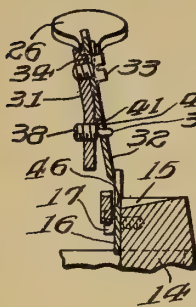
E. R. JOHNSON.  
CUTTER FOR SOUND REPRODUCING STYLI.  
APPLICATION FILED NOV. 18, 1912.

1,229,469.

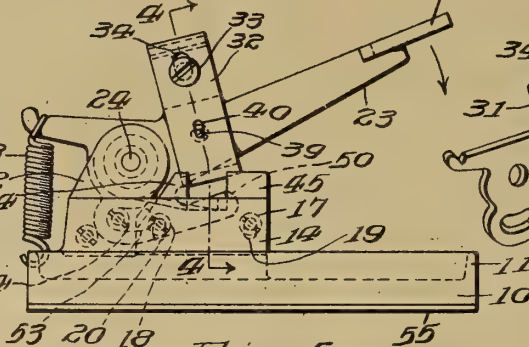
Patented June 12, 1917.



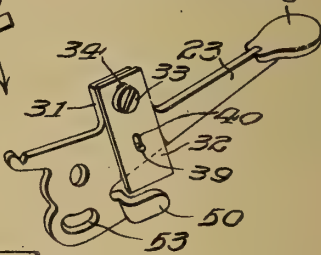
*Fig. 4.*



*Fig. 3.*

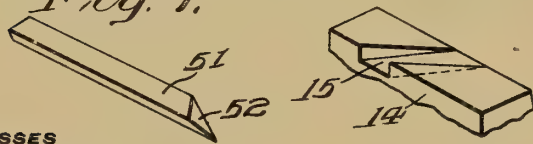


*Fig. 6.*



*Fig. 5.*

*Fig. 7.*



WITNESSES

*H. J. Hartman.*  
*Clifton C. Halliwell*

BY

INVENTOR  
*Eldridge R. Johnson.*

*H. Mac Littel.*

ATTORNEY

# UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF MERION, PENNSYLVANIA, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

## CUTTER FOR SOUND-REPRODUCING STYLI.

1,229,469.

Specification of Letters Patent. Patented June 12, 1917.

Application filed November 18, 1912. Serial No. 731,955.

*To all whom it may concern:*

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of Merion, county of Montgomery, State of Pennsylvania, have invented certain new and useful Improvements in Cutters for Sound-Reproducing Styli, whereof the following is a specification, reference being had to the accompanying drawings.

This invention particularly relates to devices for cutting or re-sharpening sound reproducing styli and is especially directed to re-pointing styli formed of vegetable fiber or other similar or suitable material.

The objects of this invention are to provide a simple and efficient stylus cutter with cooperating cutting blades adapted to shear a stylus, including a stationary shearing blade and a movable cutting blade disposed in a relatively angular position with respect to said stationary blade and adjustably mounted on a pivoted lever adapted to movably support the cutting blade and yielding means tending to automatically shift said lever to its inoperative position to separate the blades. Further objects of this invention are to provide adjustable means to vary the tension of the movable blade to afford different degrees of frictional engagement between the stationary and movable blades so that the apparatus may be adjusted and maintained in a position to make a clean cut at the end of a used stylus needle to efficiently resharpen the same.

In the accompanying drawing, Figure 1 is a longitudinal sectional elevation of a stylus cutter showing a convenient embodiment of this invention; Fig. 2 is a plan view of the stylus cutter shown in Fig. 1; Fig. 3 is a front elevational view of said stylus cutter; Fig. 4 is a fragmentary sectional view taken on the line 4-4 in Fig. 3; Fig. 5 is a fragmentary perspective view of the supporting block showing the inclined diagonal channel for directing the stylus needle between the cooperative cutting blades; Fig. 6 is a perspective view of the pivoted lever carrying the movable cutting blade; and Fig. 7 is a perspective view of a triangular fiber needle.

In said drawings, the base plate 10 is provided with the perimetral flange 11 projecting upwardly and forming a receptacle 12 for the shavings or chips sheared from the stylus needles, and is also provided with a

supporting block 14, preferably integral with the base-plate 10 and having an inclined diagonally disposed slot 15 forming a guide for directing the stylus needles to be cut toward the stationary shearing or cutting blade 16. Said stationary blade 16 is preferably flat and is suitably supported in a vertical plane on said supporting block 14 by the set screws 17 and 18 respectively extending through vertical slots 19 and 20 in said blade, which permits the vertical adjustment of said blade with respect to said supporting block 14.

To the supporting block 14 is secured the standard plate 22 which carries the pivoted lever or support 23 mounted for oscillation upon the shaft 24 and retained thereon by the head 25. Said lever 23 is provided at its free end with a thumb plate 26 by which it may be oscillated in the direction of the arrow indicated in Fig. 3, in opposition to the spiral spring 28, which is connected to the notched projecting arm at the opposite end of the lever 23, and to the flange 11 of the base plate 10, and which is arranged to maintain the lever 23 normally in its inoperative position as shown in full lines in Fig. 1.

The lever 23 is mounted to oscillate in a plane parallel with, but spaced from the plane of the stationary shearing blade 16 and is provided with an upwardly extending lug 31 which is bent backwardly into an oblique plane intersecting the plane of said shearing blade 16, and carries the movable cutting blade 32 which is secured to said upwardly extending lug 31 by the set screw 33, which extends through the slot 34 in said cutting blade 32, and is in threaded engagement with said lug 31. The cutting blade 32 projects downwardly from the lug 31 and the lower portion of the blade projects from the side of the lever 23 and is provided at its lower end with a sharp cutting edge 35 which is preferably longitudinally straight and transversely acute. The cutting edge 35 of this movable cutting blade 32 may be yieldingly pressed into engagement with the flat vertical side of the stationary shearing blade 16 by the adjusting screw 38, which is in threaded engagement with the pivoted lever 23, and has the reduced projection 39 extending through the slot 40 in said movable blade. The projection 39 provides a shoulder 41 bearing



against the inner surface of the cutting blade 32, whereby said cutting blade 32 may be flexed or sprung as desired to vary the tension and consequently the frictional engagement with said stationary blade 16, which is provided with upwardly extending portions 44 and 45 disposed upon opposite sides of its sharpened edge 46 for the engagement of said cutting edge of said movable blade 32 when separated from the cutting edge of the stationary blade, and for guiding the cutting edge of the movable blade 32 into co-operative engagement with the cutting edge of said stationary blade 16.

15 The pivoted lever 23 is also provided with a projecting finger 50, which extends therefrom generally in the direction of the free end of said lever, and is bent inwardly into a plane adjacent to the plane of the stationary shearing blade 16, and when said lever is in its inoperative position to separate the blades, said finger is disposed across the inner end of the diagonally inclined channel 15, and in the path of the stylus needle 51 which may be guided by said channel, and which is limited in its inward movement by said finger 50 which, as will be readily seen by reference to the dotted line position shown in Fig. 1, is moved away from the end of the stylus needle as the free end of the lever is pressed downwardly by the operator, to effect the shearing of the end 52 of said needle. By reason of the withdrawal of said finger, it will be seen that the shaving or chip of stylus sheared by the co-operation of the blades is free to be ejected from said blades and to be collected in the receptacle 12 provided therefor in the base plate 10.

40 Said pivoted lever 23 is provided with the slot 53 which is co-operative with the head of the screw 54 which extends into said slot and which is in threaded engagement with the standard plate 22 to limit the movement of oscillation of the pivoted lever 23, as best shown in Fig. 1.

The base plate 10 may be preferably provided on its bottom surface with a facing 55 of felt, leather or other suitable material for preventing the device from scratching any surface upon which it may be supported.

The cutter above described operates as follows: A stylus needle, preferably of triangular cross-section, as shown in Fig. 7, is inserted in the channel 15 with one of its sides resting on the bottom of said channel, and is forced into engagement with the finger 50, and held preferably by the thumb of the left hand of the operator, who, at the same time, with his right hand presses the free end of the pivoted lever 23 downwardly as indicated by the arrow in Fig. 3, to the position

shown in dotted lines in Fig. 1, which movement of the lever 23 forces the cutting edge of the movable cutting blade 32 down into co-operative engagement with the shearing edge of the stationary shearing blade 16, and removes a shaving or chip from the end of the stylus needle, of a thickness equal to the space between the plane of the shearing edge of the stationary shearing blade 16 and the plane of the adjacent surface of the finger 50, which shaving, by virtue of the fact that the finger is shifted clear of the end of the stylus needle when the blades are actuated, is freely ejected from said blades and permitted to drop into the receptacle 12 provided therefor in the base plate 10.

It will be readily seen that by reason of the fact that the movable cutting blade 32 is disposed at an angle with respect to the plane of the stationary shearing blade 16, and is adjustable to vary the frictional contact therewith, a clean cut of the end of the stylus needle is readily afforded, and that by virtue of the finger 50 being normally maintained in a position to stop the needle thrust into the channel 15, when the blades are separated a uniform chip or shaving will be insured.

It is not desired to limit this invention to the precise details of construction and arrangement herein set forth, as various modifications may be made therein without departing from the essential features of the invention as defined in the appended claim.

Having thus described my invention, I claim:

In a stylus cutter, the combination of a stationary blade having a cutting edge and a guiding surface flush with the active edge of said blade and extending on a side of the cutting edge of said stationary blade, a blade carrier mounted to move in a plane substantially parallel to the said guiding surface of said stationary blade, a cutting blade secured to said carrier and disposed in a plane making a slight angle with the plane of said guiding surface of said stationary blade, said blade on said carrier being relatively long and having one of its short ends secured to said carrier and its opposite short end provided with a cutting edge, and means carried by said carrier and disposed between said blade and said carrier to flex said blade laterally to adjust and regulate the pressure between said blades.

In witness whereof, I have hereunto set my hand this 15th day of November, 1912.

ELDRIDGE R. JOHNSON.

Witnesses:

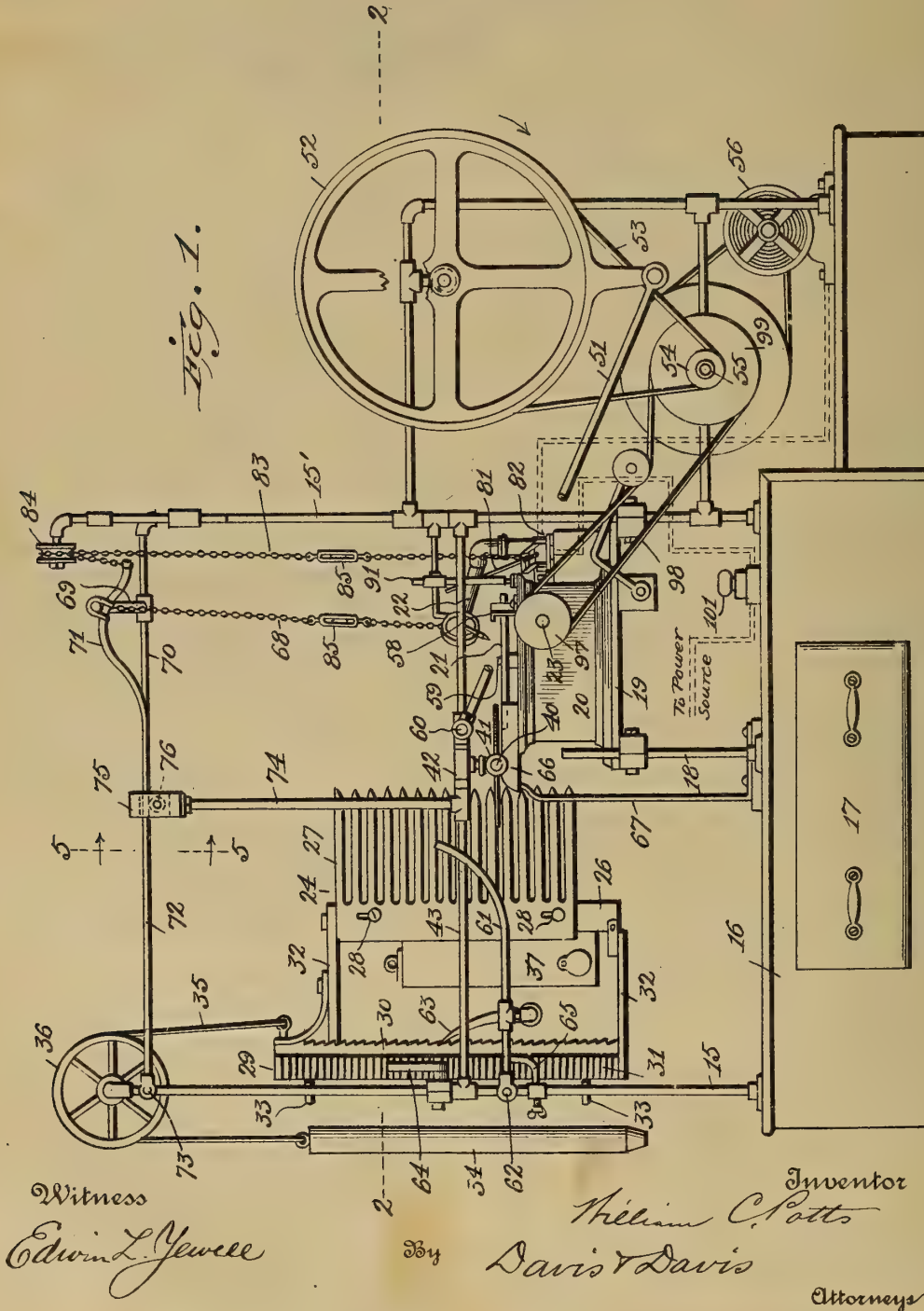
FRANK B. MIDDLETON, Jr.,  
HARRY COBB KENNEDY.

GRAPHOPHONE,  
#1,229,518-----William C. Potts,  
Patented-June 12th, 1917.  
Filed-November 15th, 1916.

W. C. POTTS.  
 GRAPHOPHONE.  
 APPLICATION FILED NOV. 15, 1916.

1,229,518.

Patented June 12, 1917.  
 4 SHEETS—SHEET 1.







1,229,518.

Patented June 12, 1917.  
 4 SHEETS—SHEET 2.

Fig. 2.

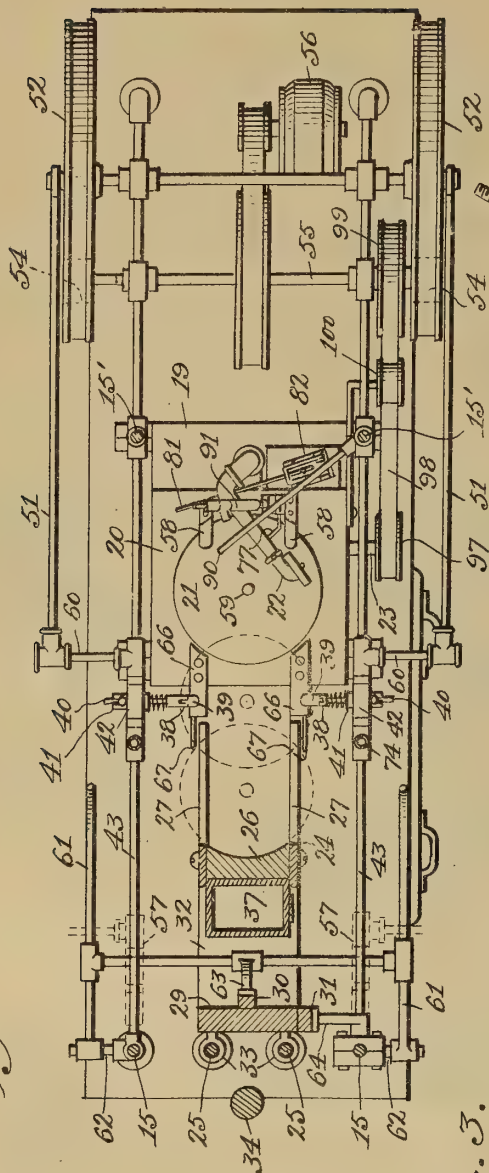


Fig. 4.

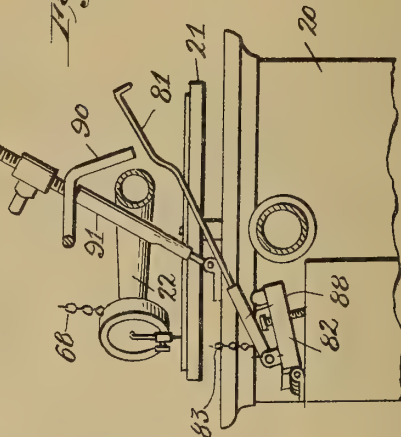
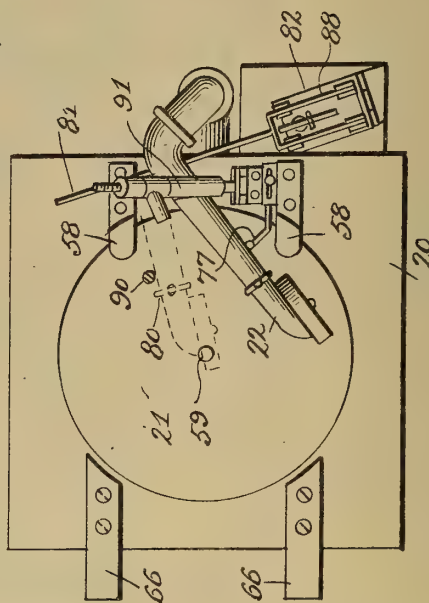


Fig. 3.



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 Attorneys





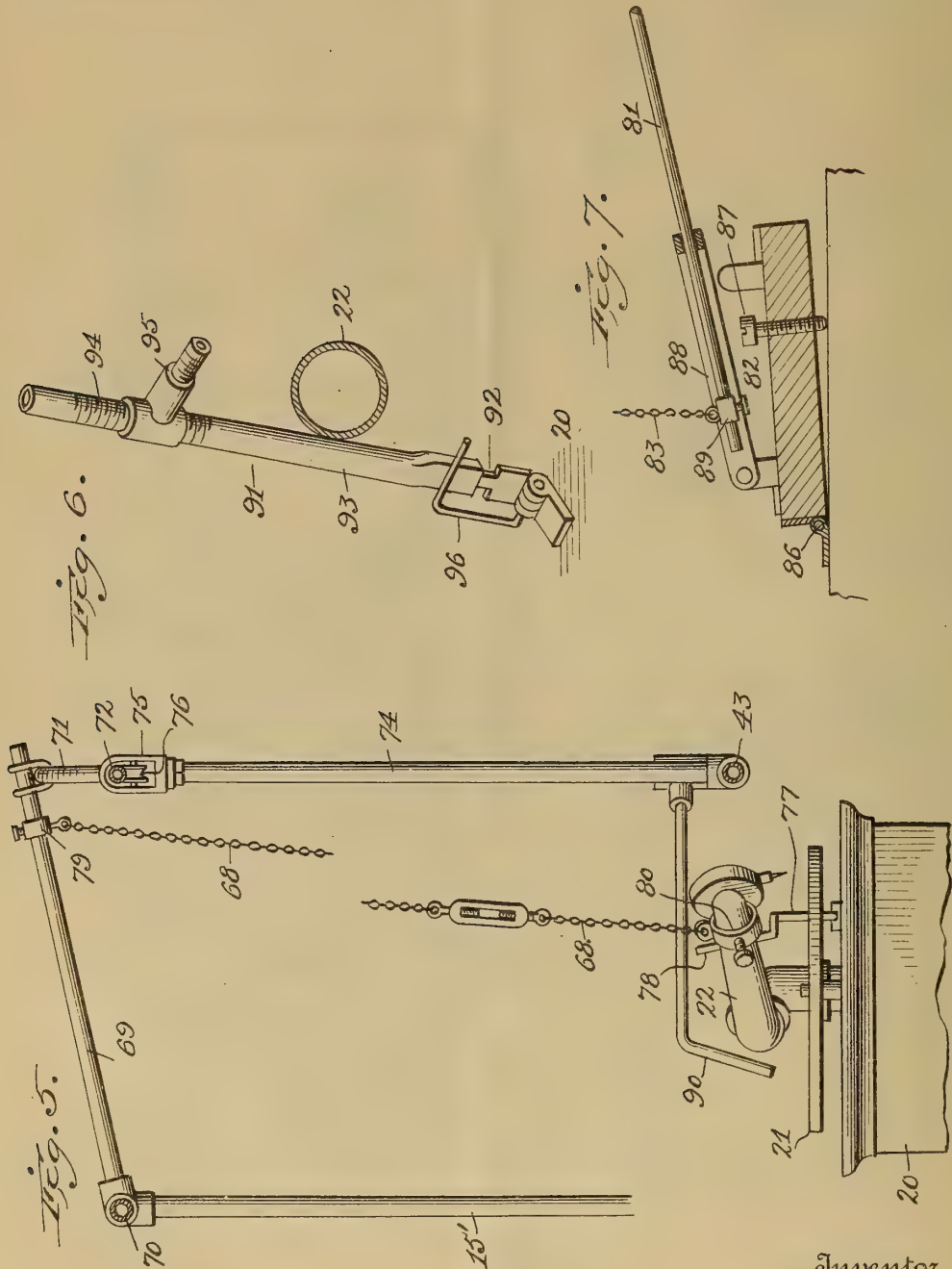
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4 SHEETS—SHEET 3.



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1,229,518.



# UNITED STATES PATENT OFFICE.

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GRAPHOPHONE.

1,229,518.

Specification of Letters Patent.

Patented June 12, 1917.

Application filed November 15, 1916. Serial No. 131,485.

*To all whom it may concern:*

Be it known that I, WILLIAM C. POTTS, a citizen of the United States of America, and a resident of Harrisburg, county of Dauphin, and State of Pennsylvania, have invented certain new and useful Improvements in Graphophones, of which the following is a full and clear specification.

This invention relates to improvements in disk-record shifting mechanism for graphophones and has for its object to provide an apparatus which will automatically place, in succession, a plurality of sound records upon the rotating table of a talking machine.

A further object is to provide means for periodically winding the operating spring of the talking machine while the records are being changed, so that a predetermined number of records can be played in succession without manual coöperation.

These and other objects hereinafter set forth are attained by the means illustrated in the accompanying drawings, in which—  
Figure 1 is a side elevation of the improved apparatus;

Fig. 2 is a horizontal sectional view on the line 2—2 of Fig. 1;

Fig. 3 is an enlarged detail plan view showing the graphophone in connection with several improved attachments;

Fig. 4 is a rear elevation of the parts shown in Fig. 3 and showing the tone-arm in section;

Fig. 5 is a detail section on the line 5—5 of Fig. 1;

Fig. 6 is a detail perspective view of the improved pushing lever;

Fig. 7 is a detail longitudinal section of an electric switch used in the apparatus;

Fig. 8 is a detail plan view of a portion of the apparatus showing the disk cabinet in section and one of the feeding fingers;

Fig. 9 is a vertical sectional view on the line 9—9 of Fig. 8;

Fig. 10 is an enlarged side view partly in section of one of the feeding fingers; and

Figs. 11 and 12 are detail views illustrating the construction of the disk-engaging ends of the feeding fingers.

Similar reference numerals in all of the figures of the drawings designate like parts.

Referring to the drawings, 15, 15' designate a series of vertical standards constituting part of a metal frame mounted upon a suitable base or cabinet 16 which contains

a drawer 17 for the reception of surplus records. The metal frame is preferably constructed of tubing and its several sections are connected together by threaded nipples and elbows in the usual manner of connecting piping. This enables the frame to be constructed cheaply, as the sections can be cut in predetermined lengths and joined or assembled together by inexpert workmen. It is understood that the base or cabinet 16 can be constructed in different designs and contain a great number of drawers if desired.

Also mounted on the base 16, intermediate the standards 15, 15', are the short standards 18, which, in coöperation with the standards 15', form a support for a vertically-adjustable platform 19 which is adapted to support the graphophone 20. The graphophone can be any one of the well known commercial devices having a rotating disk table 21, a pivoted tone-arm 22 and a winding shaft 23.

To one side of the graphophone is a record magazine 24 mounted to slide vertically on intermediate standards 25. This magazine 24 comprises a back 26 and slotted sides 27, and said sides are adjustably secured to said back 26 by the slot and screw construction shown at 28. Secured to the rear of the magazine, by brackets 32, is a supplemental back 29 provided with a front rack-bar 30 and a side rack-bar 31, this supplemental back being slidably engaged by eyes 33 with the standards 25. A counter-balance weight 34 is provided for said magazine, the same being connected thereto by a cable or rope 35 which engages a pulley 36 mounted on the metal frame. The weight of the counter-balance is approximately equal to the weight of the magazine filled with records, and, in order to keep the weight of the magazine and its counter-balance equal, should some of the records be removed, a sand-box 37 is secured to the back of the magazine having suitable openings through which sand can be added or withdrawn when necessary.

The disks or records are shifted to and from the magazine and table by the fingers 38, one on each side of the apparatus, each of which embodies a head 39 pivoted to a stem 40 which is slidably mounted in transverse sleeve 41 carried by a carriage 42 mounted to slide upon the horizontal guide-rods 43 fixed between the standards 15 and 15'. These fingers are normally pressed to-

ward each other into the path of the disks by springs 44 mounted on the stems 40 between the sleeves 41 and heads 39, and are prevented from rotating in their bearings by  
 5 pins 45 secured to said stems 40, said pins 45 slidably engaging in slots 46 in the sleeves 41. Heads 39 are formed with upper and lower jaws 47 and 48, respectively, said  
 10 lower jaw having opposite upwardly and inwardly-inclined faces which are adapted to engage the edges of the disks to bodily lift them horizontally for a purpose hereinafter described. The heads are pivoted to the stems by the pivot bolts 49 and are retained in a horizontal or vertical position  
 15 by tightening the pivot bolts.

The carriages 42 are each preferably constructed with a series of metal T's connected together with suitable nipples 50 and are reciprocated by the pitman rods 51 which  
 20 are operated by the crank-wheels 52, and in turn these crank-wheels are driven by belts 53 engaging pulleys 54 on a drive-shaft 55 which is driven from a suitable electric motor 56 in any suitable manner.

The initial or starting position of the carriages 42 is at the rear of the magazine, as shown in dotted lines at 57 in Fig. 2, and, as they move forwardly, the feeding fingers  
 30 engage one of the disks and carry it, after slightly raising it, to a point directly over the center of the disk table 21, where it is stopped by the lugs 58 which are fixed to the graphophone casing. When the disk is  
 35 stopped, the fingers continue their forward movement until they have passed beyond the stopped disk. As the fingers pass beyond the disk, it drops upon the disk table in a position to be rotated therewith. On the  
 40 backward movement of the fingers, they again engage the disk, first slightly raising it from the centering pin 59, and carry and deposit it in the same slot of the magazine from which it was taken. After the disk is  
 45 returned, the fingers and carriage continue their backward movement beyond the magazine and during their passage back of the magazine, the pitman connections 60 engage the cam-levers 61, which are pivoted  
 50 at 62 to the standards 15, and raise them and a pawl 63 carried thereby. The pawl engages the rack-bar 30 and consequently raises the magazine one step, or in a position to present the next succeeding disk in the  
 55 path of the feeding fingers. A pawl 64 is suitably pivoted to one of the standards 15 and is adapted to engage the rack-bar 31 to prevent a downward movement of the magazine while the pawl 63 is being lowered to  
 60 engage the next lower tooth of its cooperating rack-bar. An adjustable stop pin 65 is mounted on one of the standards 15 and is adapted to engage one of the cam-levers 61 to limit the downward movement thereof.  
 65 By adjusting this stop up or down, the

amount of movement given to the pawl 63 can be regulated, thereby regulating the movement of the magazine so that the disks will be presented in their proper horizontal plane to be engaged by the traveling fingers.  
 70 To guide the disks or records in their horizontal position from one position to another, guide-blocks 66 are secured to the graphophone case in alinement with the slotted sides of the magazine. The top surfaces of  
 75 these guide-blocks lie substantially in the same plane as the top surface of the disk table and the disk slots in the magazine. Thus, should the disks accidentally tip while changing their position, the guide-blocks  
 80 will prevent them from being displaced. Vertical rods 67 depend from the guide-blocks 66 and are adapted to form holders for the disks to prevent them from being displaced from the magazine.

While a record or disk is being placed  
 85 upon the disk table, the tone-arm 22 and its needle are, of course, elevated out of the way. In the present construction, the tone-arm is held elevated by a chain 68 secured  
 90 at its upper end to a transverse arm 69 which is pivoted upon a side-bar 70 of the main frame. Said transverse arm 69 has its free end secured to a curved portion 71 of a rod 72, which forms a cam on the free end of  
 95 said rod which is pivoted at 73 to one of the standards 15. This rod 72 has a straight portion for a greater part of its length which lies parallel with the guide-rods 43 and the curved cam portion 71 at its outer  
 100 end which is curved upwardly. The rod 72 is vertically reciprocated by the movement of one of the carriages through the rod connection 74, the same being connected rigidly at its lower end to said carriage and  
 105 slidably connected at its upper end to said rod 72. The upper end of rod 74 is formed with a loop or yoke 75 through which the rod 72 passes and said yoke is preferably provided with a loose pulley or supporting  
 110 roller 76 which engages the under side of the rod 72. As the carriage 42 which carries the rod 74 moves forwardly to deliver a disk upon the disk table, there is no downward movement of the tone-arm 22 until the yoke  
 115 75 engages the cam 71, and when that point is reached, rod 72 moves downwardly carrying therewith the free end of said rod 69, consequently allowing the tone-arm to descend gradually upon the record disk.

To properly position the needle of the tone-arm upon the disk, an adjustable starting stop 77 is provided, the same comprising a slotted base which is secured to the main casing and an inclined, vertically-disposed  
 125 stop arm 78 (Fig. 5) against which the tone-arm is swung; and then allowed to settle gradually and easily until the needle reaches the disk. The limit of swing of the tone-arm is effected by the adjustment of the 130



chain collars 79 and 80 which are adjustable upon the arm 69 and tone-arm 22, respectively. In practice, it is found preferable for best results to have the upper connection of the chain 68 slightly beyond the lower connection, so that a slight pull of the tone-arm in the direction of the stop 77 is secured. The cam portion of the rod 72 is sufficiently high to allow a slight slack of chain when the needle reaches the record, so that no perceptible pull is exerted upon the chain when the needle is crossing the record. The record is rotated in the usual manner by a spring located within the casing of the graphophone, and the needle travels the grooves of the record in the ordinary way.

When the needle reaches the end of the groove or a point slightly beyond the end, the tone-arm engages an extended arm 81 of an electric switch 82 and presses said arm down to close the switch. Immediately the motor 56 is started and the carriages are moved backwardly, and the roller 76 commences to lift the rod 72 which then raises the tone-arm and the needle from the record, so that the feeding fingers can engage and lift the record from the disk table and deliver it back to the magazine. When the tone-arm needle is lowered to the record, the electric switch is disconnected automatically by a chain 83 which is operated by the downward movement of the cam rod 72, said chain 83 passing over a pulley 84 mounted on the main frame and having its ends connected respectively to the end of said rod 72 and the electric switch. Both chains or flexible connections 63 and 83 are provided with turn-buckles 85 for regulating their length.

Switch 82 has its base mounted adjacent the casing of the graphophone and said base is preferably hinged at 86 and provided with an adjusting screw 87 by which said base can be adjusted to and from its support and pivoted yoke 88. The pivoted yoke 88 is lifted by the chain 83, the lower end of said chain being provided with a collar 89 mounted adjustably on the inner end of the extended arm 81. By adjusting said collar on said rod 81, the degree of separation between the electric contacts can be regulated to a nicety.

To limit the movement of the tone-arm after the record has been played, an end-stop 90 is provided. This stop is preferably formed with a horizontal arm secured at one end to one of the standards 15' and having at its other end a depending inclined arm which is adapted to be engaged by the tone-arm.

To prevent the needle from jumping out of the disk groove while playing and to forcibly push it along the groove in the direction of the end-stop 90, a pusher 91 is provided. This element has been found to be very important in the successful operation

of the apparatus, as experiments have developed the fact that the tone-arm and needle are inclined to drag and jump the groove without it. Furthermore, it has been found necessary to provide this pusher 91 to force the tone-arm beyond the finishing end of the record to engage the end-stop 90, which is so positioned that records of different lengths can be played. Thus, with either a short or a long record, the tone-arm and its needle do not stop when the finishing end of the groove is reached, but are pushed farther along to engage the end-stop 90 and arm 81 of the electric switch to start the motor. Thus it will be seen that this apparatus is adapted to receive and play successfully either long or short records. As clearly seen in Fig. 6 of the drawings, said pusher 91 is preferably formed with a standard 92 (which is angular in cross-section) hinged to the top of the main casing of the graphophone. Fitted upon the standard 92 is a tubular pusher-arm 93 which has an angular socket at its lower end to receive the angular standard, so that the pusher-arm 93 is mounted non-rotatably. The upper end of the pusher-arm 93 is screw-threaded at 94 to receive a weight-carrier 95 which is adjustable around the pusher-arm to change the center of gravity of the pusher, so that, when the tone-arm is swung to the starting position, its engagement with the stop 77 can be regulated to a nicety to prevent abrupt contact. The pusher-arm normally rests in an inclined position against the tone-arm and its tendency to fall pushes it against the tone-arm to force it toward the end-stop 90. At the starting point the inclination of the push-arm is regulated by the gravity changing weight, which can be so adjusted to position the push-arm slightly inclined and at the same time in a balanced position. A stop 96 can be provided to prevent the pusher from being thrown backward.

When a graphophone is first placed in the apparatus, the usual winding crank is removed and a pulley 97 substituted. This pulley is connected by belting 98 with a pulley 99 mounted on the drive shaft 55. The tension of belt 98 is regulated by the belt-tightener 100, and the degree of tension given is only sufficient to allow the belt to slip when the graphophone spring is wound. Thus every time the motor 56 is started to operate the disk-shifting mechanism, the spring will be wound, if needed.

In operation, the magazine is provided with as many records as is desired and then counter-balanced by adding or removing weight from the box 37. The magazine is then positioned with the uppermost record in horizontal alinement with the disk table and with the feeding carriages preferably to the rear of the magazine. The motor is now started by closing the line switch 101. 130



Immediately the carriages and feeding fingers move forwardly the spring mechanism commences to wind the spring, the record is engaged, lifted, and carried until stopped by the lugs 58, when the fingers will continue their forward movement, the record will drop on the disk table, and at the same time the tone-arm and needle will be lowered to playing position. The graphophone spring mechanism is released by the lowering of the tone-arm, which opens the switch 82 and stops the motor, thus releasing the power of the motor from the spring mechanism which allows the spring to unwind through the slipping of its belt connection with the motor, said belt being tensioned to slip on its pulleys when the motor stops or when the spring is fully wound. Thus the disk table is rotating when the record is placed thereon; therefore, when the needle is lowered, the playing starts. Playing continues until the end of the record is reached, when the tone-arm is pushed against the end-stop 90 and at the same time on the arm 81 of the switch, depressing the same and closing the circuit to the motor, which starts the carriages and feeding fingers backward to lift the record from the disk table and deliver it to its place in the magazine. As the record is placed in the magazine, the carriages engage the cam-arm 61, thereby operating the pawl 63 to elevate the magazine one step, so that the next record in order is placed in horizontal alinement with the disk table to be carried thereto by the fingers. This operation continues successively until the switch 101 is opened.

Sometimes it is desired to repeat the record on a disk; to do this, the heads 39 of the feeding fingers are turned to inoperative position, as shown in dotted lines in Fig. 10, and the pawl 63 is thrown back. In this position of the parts, the magazine will not be elevated, nor will the record disk on the table be disturbed, but the carriages will move back and forth, the tone-arm and needle will be shifted, and the spring will be wound as before stated. Thus one record can be automatically repeated as often as desired.

Having thus described my invention, what I claim is:

1. In combination with a graphophone having a record-receiving table, a main frame, a magazine mounted on said frame to one side of said table and constructed to support a plurality of records with their opposite edges projecting beyond its sides, a reciprocating means mounted to slide on said frame and adapted to engage the projecting edges of said records successively to bodily shift them back and forth between said magazine and table, and an elevating means embodying pivoted cam-arms con-

nected together mounted on said frame and carrying a pivoted pawl in engagement with said magazine and adapted to be operated by said reciprocating means for vertically adjusting the magazine.

2. In combination with a graphophone having a record-receiving table, a main frame, a magazine provided with front and side rack bars mounted on said frame to one side of said table and constructed to support a plurality of records with their opposite edges projecting beyond its sides, a reciprocating means mounted to slide on said frame and adapted to engage the projecting edges of said records successively to bodily shift them back and forth between said magazine and table, an elevating means mounted on said frame and embodying pivoted cam-arms carrying a pawl which engages one of the rack bars on the magazine to raise the same, said elevating means being adapted to be operated by said reciprocating means, and a second pawl pivoted to said frame in engagement with the remaining rack bar to retain the magazine in its adjusted positions.

3. In combination with a graphophone having a record-receiving table, and a tone-arm pivoted for horizontal and vertical movements, a main frame, a vertically-adjustable record magazine mounted on said frame, a reciprocating means for shifting said records successively back and forth between said magazine and table, a rod pivoted to said frame having a flexible connection with said tone-arm, and an operating means on said reciprocating means for vertically moving said pivoted rod to raise and lower said tone-arm from and to said table.

4. In combination with a graphophone having a record-receiving table and a tone-arm pivoted for horizontal and vertical movements, a main frame, a vertically-adjustable record magazine mounted on said frame, a reciprocating means for shifting said records successively back and forth between said magazine and table, a rod pivoted to said frame having a flexible connection with said tone-arm, and an operating means on said reciprocating means for vertically moving said pivoted rod to raise and lower said tone-arm from and to said table, said operating means embodying a rod connection having a sliding connection at its upper end with said pivoted rod.

5. In combination with a graphophone having a record-receiving table and a tone-arm pivoted for horizontal and vertical movements, a main frame, a vertically adjustable record magazine mounted on said frame, a reciprocating means for shifting said records successively back and forth between said magazine and table, a rod pivoted to said frame provided with a curved portion forming a cam on one end and having a flexi-

ble connection with said tone-arm, and an operating means on said reciprocating means for vertically moving said pivoted rod to raise and lower said tone-arm from and to said table.

6. In combination with a graphophone having a record-receiving table and a tone-arm pivoted for horizontal and vertical movements, a main frame, a vertically-adjustable record magazine mounted on said frame, a reciprocating means for shifting said records successively back and forth between said magazine and table, a rod pivoted to said frame provided with a curved portion forming a cam on one end, a pivoted transverse arm having one end secured to said curved portion of the pivoted rod and having a flexible connection with said tone-arm, and an operating means on said reciprocating means for vertically moving said pivoted rod to raise and lower said tone-arm from and to said table.

7. In combination with a graphophone having a record-receiving table and a tone-arm pivoted for horizontal and vertical movements, a main frame, a vertically-adjustable record magazine mounted on said frame, a reciprocating means for shifting said records successively back and forth between said magazine and table, a rod pivoted to said frame provided with a curved portion forming a cam on one end, a pivoted transverse arm having one end secured to said curved portion of the pivoted rod and having an adjustable flexible connection with said tone-arm, and an operating means on said reciprocating means for vertically moving said pivoted rod to raise and lower said tone-arm from and to said table.

8. In combination with a graphophone having a record-receiving table and a tone-arm pivoted for horizontal and vertical movements, a main frame, a vertically-adjustable record magazine mounted on said frame, a reciprocating means for shifting said records successively back and forth between said magazine and table, a rod pivoted to said frame having a flexible connection with said tone-arm, an operating means on said reciprocating means for vertically moving said pivoted rod to raise and lower said tone-arm from and to said table, and stops on said graphophone for limiting the lateral movement of said tone-arm in both directions.

9. In combination with a graphophone having a record-receiving table and a tone-arm pivoted for horizontal and vertical movements, a main frame, a vertically-adjustable record magazine mounted on said frame, a reciprocating means for shifting said records successively back and forth between said magazine and table, a rod pivoted to said frame having a flexible connection with said tone-arm, an operating means on

said reciprocating means for vertically moving said pivoted rod to raise and lower said tone-arm from and to said table, and stops on said graphophone for limiting the lateral movement of said tone-arm in both directions, one of said stops being adjustable to an from said table to position the tone-arm at the starting point of the records.

10. In combination with a graphophone having a record-receiving table and a tone-arm pivoted for horizontal and vertical movements, a main frame, a vertically-adjustable record magazine mounted on said frame, a reciprocating means for shifting said records successively back and forth between said magazine and table, a rod pivoted to said frame having a flexible connection with said tone-arm, an operating means on said reciprocating means for vertically moving said pivoted rod to raise and lower said tone-arm from and to said table, and stops on said graphophone for limiting the lateral movement of said tone-arm in both directions, one of said stops being inclined upwardly and inwardly and adjustable to and from said table to position the tone-arm at the starting point of the records.

11. In combination with a graphophone having a record-receiving table and a tone-arm pivoted for horizontal and vertical movements, a main frame, a vertically-adjustable record magazine mounted on said frame, a reciprocating means for shifting said records successively back and forth between said magazine and table, a rod pivoted to said frame having a flexible connection with said tone-arm, an operating means on said reciprocating means for vertically moving said pivoted rod to raise and lower said tone-arm from and to said table, a motor for operating said reciprocating means, and a motor control means adapted to be operated by said tone-arm at the end of its inward movement.

12. In combination with a graphophone having a record-receiving table and a tone-arm pivoted for horizontal and vertical movements, a main frame, a vertically-adjustable record magazine mounted on said frame, a reciprocating means for shifting said records successively back and forth between said magazine and table, a rod pivoted to said frame having a flexible connection with said tone-arm, an operating means on said reciprocating means for vertically moving said pivoted rod to raise and lower said tone-arm from and to said table, a push-arm for said tone-arm, a motor for operating said reciprocating means, and a motor control means adapted to be operated by said tone-arm at the end of its inward movement.

13. In combination with a graphophone having a record-receiving table, a spring for rotating said table, a winding shaft for said spring, and a tone-arm pivoted for hori-

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zontal and vertical movements, a main frame, record-shifting means mounted thereon for supplying in succession a plurality of records to said record-receiving table and  
5 operating said tone-arm, a motor for operating said record-shifting means and having a driving connection with said winding shaft, and a motor control means adapted to be operated by said tone-arm at the end  
10 of its inward movement.

14. In a machine of the class set forth, a gramophone embodying a record-receiving table, a record magazine vertically movable with respect to said table and arranged at  
15 one side thereof, record-carrying means provided with record-grasping devices adapted to frictionally engage the record at diametrically opposite sides to enable them to slip past the record, means for reciprocating said  
20 record-carrying means together with its record-grasping devices to shift said record-grasping devices from a point beyond the magazine to a point beyond the center of the record-receiving table, and means on the  
25 magazine and gramophone for limiting the travel of the record in each direction and to allow the record-grasping devices to slip past the record.

15. The structure defined in claim 14, said  
30 record-grasping means consisting of a pair of inwardly-extending fingers constructed to lift the record upwardly off the record-table pin during the movement of the carriage-means toward the magazine.

35 16. The structure defined in claim 14, said record-grasping means consisting of a pair of inwardly-extending fingers having V-shaped notches in their ends, for the purpose set forth.

40 17. In combination with a gramophone having a record-receiving table, a record magazine and means for vertically shifting

it, a carriage-means carrying devices for grasping the record at diametrically opposite points, means for shifting the carriage- 45 means horizontally from a point beyond the magazine to a point beyond the center of the record-receiving table, the record-grasping means being adapted to release the record as the carriage-means passes the maga- 50 zine and also as it passes the record table in going in the opposite direction, means whereby movement of the carriage-means beyond the magazine operates the magazine-shifting devices, and means whereby the 55 movement of the carriage-means beyond the center of the record table lowers the tone-arm to the record.

18. In combination with a spring-actuated gramophone having a record-receiving table, 60 a record magazine and means for vertically shifting it, a carriage-means carrying devices for grasping the record at diametrically opposite points, means for shifting the carriage-means horizontally from a point 65 beyond the magazine to a point beyond the center of the record-receiving table, the record-grasping means being adapted to release the record as the carriage-means passes the magazine and also as it passes the record 70 table in going in the opposite direction, means whereby movement of the carriage-means beyond the magazine operates the magazine-shifting devices, means whereby the movement of the carriage-means beyond 75 the center of the record table lowers the tone arm to the record, motor means for winding the spring of the gramophone, and devices whereby this motor is actuated to wind this spring during the movement of 80 the carriage-means.

In testimony whereof I hereunto affix my signature.

WILLIAM C. POTTS.



EXHIBITION DE LA  
1, 1917, 1918

DEVICE FOR TRANSMITTING  
OR TRANSFORMING MICROMOVEMENTS,  
#1,229,619-----J. A. Johnsen,  
Patented-June 12, 1917.  
Filed-December 31st, 1915.

J. A. JOHNSON.

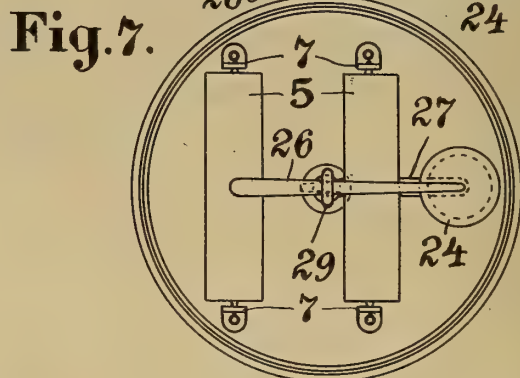
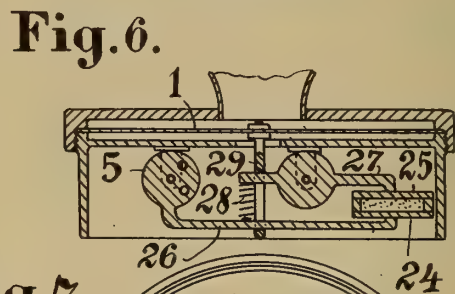
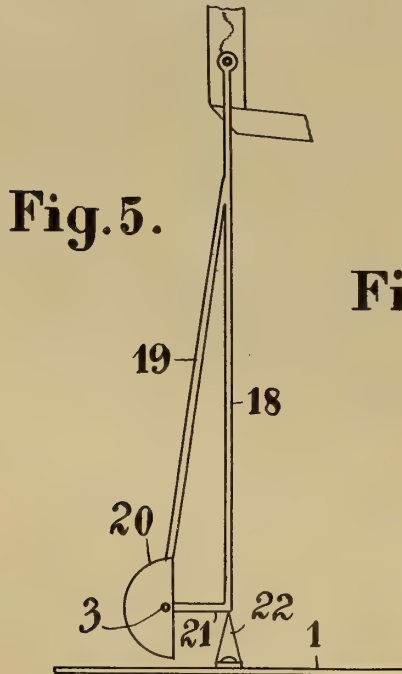
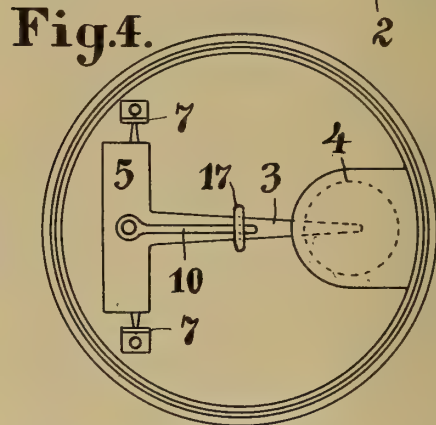
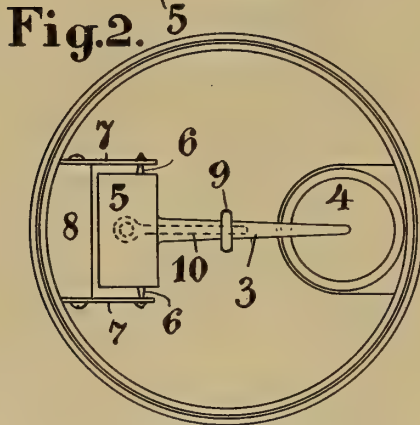
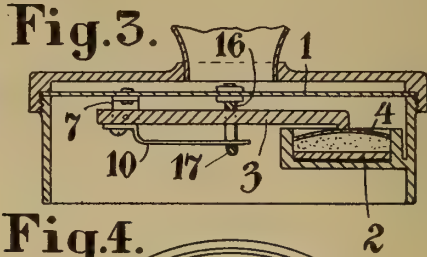
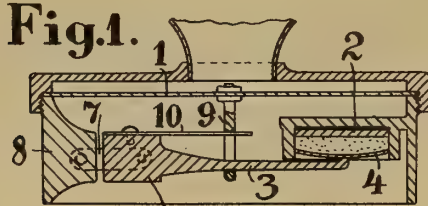
DEVICE FOR TRANSMITTING OR TRANSFORMING MICROMOVEMENTS.

APPLICATION FILED DEC. 31, 1915.

1,229,619.

Patented June 12, 1917.

2 SHEETS—SHEET 1.



Inventor

Jonas Albert Johnson  
by *[Signature]*  
his Attorney





J. A. JOHNSEN.

DEVICE FOR TRANSMITTING OR TRANSFORMING MICROMOVEMENTS.

APPLICATION FILED DEC. 31, 1915.

Patented June 12, 1917.

2 SHEETS—SHEET 2.

1,229,619.

Fig.8. Fig.9.

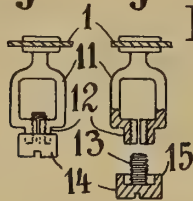


Fig.10. Fig.11.

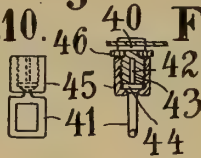


Fig.12. Fig.13. Fig.14.

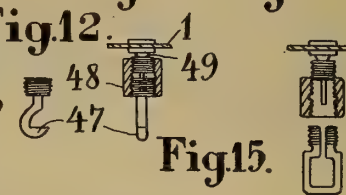


Fig.15.



Fig.16.

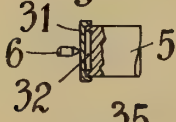


Fig.17.

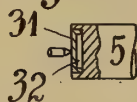


Fig.22.



Fig.18.

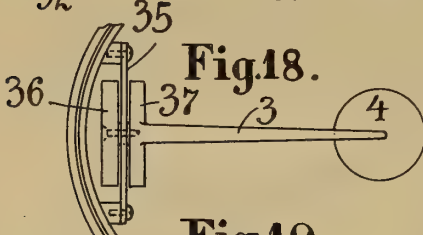


Fig.19.

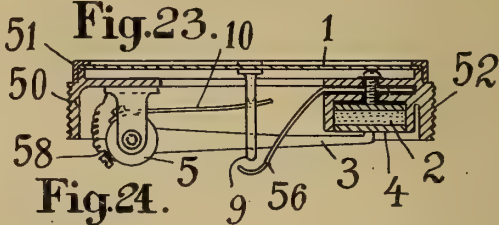
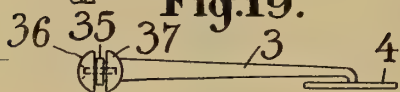


Fig.24.

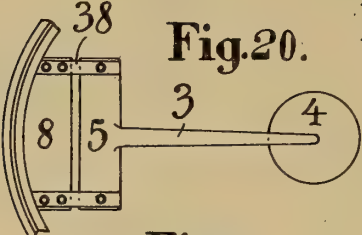


Fig.20.

Fig.25.

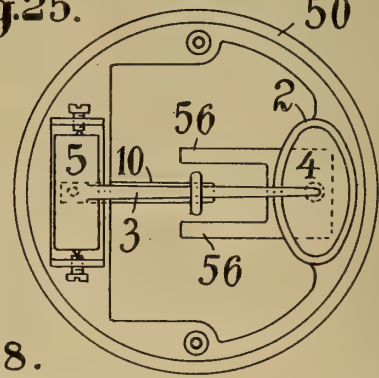


Fig.21.

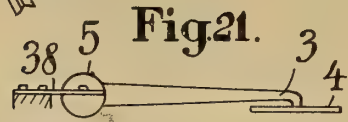


Fig.26. Fig.27



Fig.28.



Fig.29.



Inventor  
Jonas Albert Johnsen  
by *Attorney*  
his Attorney

# UNITED STATES PATENT OFFICE.

JONAS ALBERT JOHNSEN, OF CHRISTIANIA, NORWAY.

DEVICE FOR TRANSMITTING OR TRANSFORMING MICROMOVEMENTS.

1,229,619.

Specification of Letters Patent.

Patented June 12, 1917.

Application filed December 31, 1915. Serial No. 69,541.

*To all whom it may concern:*

Be it known that I JONAS ALBERT JOHNSEN, a subject of the King of Norway, residing at Christiania, Norway, have invented certain new and useful Improvements in Devices for Transmitting or Transforming Micromovements; and I do hereby declare the following to be a full, clear and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

In various apparatus it is required to transmit a rapid oscillatory movement from one member to another and in some cases at the same time to alter (increase or reduce) the oscillations. This applies more particularly to devices such as microphones, telephones, gramophones, automatic recording devices, etc., and generally to any apparatus whose function is based or depends upon what may be designated by the general term of micro-movements.

While the transmission of oscillatory movements by means of lever systems generally presents in mechanics no particular difficulties, the simple law according to which the product of the lever by the power remains constant and which affords the necessary guidance for designing mechanisms of this nature for the transmission of micro-movements by means of levers has presented difficulties which have not as yet been overcome. Many efforts have been made, for instance, to increase the strength of a microphone by connecting the diaphragm and the member acting on the carbon box by means of a lever system or to transmit the oscillations of a primary swinging diaphragm to another one (the latter to perform increased movements) by means of a lever system. These and several other endeavors have remained however without success the calculated or any increase at all of the oscillations or of the secondary effects of the swinging member having failed to be realized.

I have now endeavored by numerous experiments to ascertain the origin of these difficulties and to provide means by which to obtain the desired results and in the following I shall briefly explain the results I have arrived at.

The main reason why lever systems act otherwise with regard to micro-movements than with regard to common oscillatory movements and why micro-movements can not be transmitted or transformed by means of levers according to the rules otherwise applying to lever systems lies in the weakness, the small amplitude and the sometimes complex character of the micro-movements and also in the fact that such movements (more particularly sound waves) besides the direct effects of the elementary movement have also secondary effects due to the rapid succession of the movements. Thus, for example, a lever subjected to the action of sound waves will transmit the oscillations independent of the length of the lever arms in directions in which the oscillations shall be most easily able to put material in oscillatory movements. In order to prevent a micro-movement imparted to a lever from being to any appreciable extent transmitted through the oscillating axis of the lever, and to provide that it shall be transmitted only through its working arm, it is essential in the first place to concentrate a sufficient mass about the oscillating axis of the lever, to enable the inertia of said mass (analogously with an anvil) to prevent the lever from getting into independent oscillations (which would be transmitted through its oscillating axis) or at any rate only to a minimum extent. I have found that with a lever consisting of one or more arms and of a body arranged in the above manner and by locating the fulcrum of the lever in or close to the center of gravity of the entire oscillating body, I am able to transmit the oscillations through levers with the desired effect.

I have further found that it is essential for obtaining the desired result that the connection between the primary oscillating member and the lever be an entirely free contact, the lever being pressed, for example, by means of a spring, against the said oscillating member. In order to obtain in practice an accurate equilibration of the lever it has proved advantageous not to support the pivots of the lever in bearings but to give them a pointed shape and arrange them to be supported by holders resilient in an axial direction.

The present invention has for its object to utilize these results in devices of every description in which an accurate transmission of micro-movements is required in con-



nection with an alteration, if any, (increase or reduction) of the movements or furtherance of certain oscillations in the case of combined or complex micro-movements.

Some examples of carrying out my invention will be described in the following specification reference being had to the accompanying drawings, in which:

Figures 1 and 2 show respectively in axial section and in plan the essential parts of a microphone with a lever system the object of which is to considerably increase the efficiency of the microphone.

Figs. 3 and 4 show a modified arrangement for the same purpose.

Fig. 5 shows diagrammatically a lever arrangement designated for use more particularly in cases where a very considerable increase of the oscillations is desired for example in the graphic record of sound waves.

Figs. 6 and 7 shows a modified arrangement of a microphone according to the present invention.

Figs. 8 and 9 illustrates a form of hook for connecting the diaphragm with the lever system.

Figs. 10-15 show details of three other forms of such hooks.

Figs. 16-21 show details of different forms of means for supporting the levers.

Figs. 22-25 illustrate a modification of a microphone according to the present invention, showing especially a preferable manner of mounting and connecting the microphone device proper with the casing.

Figs. 26-29 show two special forms of electrodes.

In Figs 1 and 2, 1 is a microphone diaphragm and 2 the carbon box which is located laterally in the microphone box and may be of any suitable construction. 3 is a lever connected at one end with a movable electrode 4 of the carbon box, which electrode may conveniently be of spherical shape so that it can be made thin and light. For the same reason the electrode may be made of aluminum which is carbonized on its active surface. The thickness of the lever increases from its tapering end toward the other end which is shown in the shape of a broad and thick boss 5 provided on its lateral faces with pins or pivots 6 which extend into corresponding recesses in the springs 7 which are secured to a projection 8 in the microphone box (it is of course sufficient for the purpose that one of the points be acted upon by a spring).

Instead of supporting the lever in the way just described I may make use of other arrangements for obtaining the result aimed at. As illustrated in Figs. 16 and 17, showing axial sections through the pivot ends of the lever boss I may obtain a laterally yielding bearing by placing a diaphragm or cap 31 on the end of the boss covering a de-

pressed portion 32 in the same. Said cap may, as shown in Fig. 16 be pressed on the boss outside the same or it may be inserted in the depressed portion as shown in Fig. 17. I may also support the lever by means of a spring thereby doing wholly away with a regular pivot arrangement. Examples of such supports are shown in Figs. 18 to 21.

In the form shown in Figs. 18 and 19 a flat spring 35 is fixed at its ends. The boss or pivot end of the lever is made in two parts 36 and 37 and secured to the spring in the manner shown so that the latter will act as a torsion spring when the lever vibrates.

In the form shown in Figs. 20 and 21 the boss is secured at its ends to spring 38 extending parallel with the lever from a fixed point of the microphone casing. The lever might also be supported by a single spring attached in a similar manner to the boss in the center line of the lever.

The connection between the microphone diaphragm 1 and the lever 3 is as shown in Figs. 1-4 effected by means of a hook 9 screwed on to the diaphragm, the lever resting within the hook and being kept pressed against the same by a spring 10 secured to the lever. Figs. 8 and 9 illustrate a more suitable form of such a hook which permits the diaphragm and the lever system to be easily disconnected.

The hook 11 is riveted to the diaphragm and has the form of a fork. The ends of the forks form each one half of a hollow pin 12. 13 is a screw which fits threads on the inside of the pin halves. The head 14 of the screw has a ridge or collar 15 which fits around the pin, so that when the lever has been inserted in the hook and the screw is applied this collar will keep the pin halves together. The lever will then rest on the end of the screw and may be adjusted by means of the screw.

Other forms of hooks are shown in Figs. 10-15.

In Figs. 10 and 11 I have shown an arrangement in which the microphone diaphragm carries a short bifurcated screwstud 40; the hook 41 is provided with a flat shaft fitting closely into the slot 43 of the screwstud and with a collar 44 serving as a bearing for a nut 45 by means of which the hook is secured to the screwstud. Adjustment of the distance between the edge of the hook and the diaphragm may be obtained by means of a washer 46.

The form shown in Figs. 12 and 13 is a modification of the form shown in Figs. 10 and 11, a right and left-threaded nut 48 being used to connect the hook 47 with the screwstud 49.

The form of hook shown in Figs. 14 and 15 resembles the modification just described but in this instance the hook itself is split



so as to allow of easy insertion and removal of the lever in the eye of the hook without disconnecting the lever from the microphone box.

5 Although it is preferable to so arrange the axis of oscillation of the lever as not to have the latter carried by the diaphragm, satisfactory results may also be attained by placing the bearings of the lever directly on the  
10 diaphragm and such an arrangement is shown in Figs. 3 and 4. In this modification the lever arrangement is inverted, the lever itself abutting against a lug 16 secured to the diaphragm and being pressed against  
15 the same by a spring 10 secured to the lever and resting within the hook 17 secured to the diaphragm.

When it is desired to increase the micro-oscillations to a very large extent, it is preferable to use a bell-crank lever as shown  
20 diagrammatically in Fig. 5. In this figure 1 represents a diaphragm and 3 the pivot point of the lever. The long arm of the latter is composed of light rods 18, 19, the first  
25 one of which has a knee 21 against which a pointed lug 22 on the diaphragm abuts. 20 is the boss of the lever, and the lever is shown as being used for recording vibrations on a strip of paper.

30 Fig. 6 shows a microphone arrangement by which an increased efficiency is obtained by a system of two combined levers. The microphone box is in this case provided with bottom- and top-electrodes 24, 25 secured to one end of levers 26, 27, the lever 26  
35 being single armed and the lever 27 double armed. A spring 28 secured to the lever 26 and abutting against the end of the lever 27 acts to keep either lever in contact with a  
40 hook 29 carried by the diaphragm.

The mode of operation of the arrangement, as will be seen, is such that an oscillation of the diaphragm in one direction will cause the operative ends of the levers to  
45 move away from each other, whereas an oscillation in the opposite direction will cause them to approach each other, and hereby the efficiency of the carbon box will be increased.

50 I shall now describe the microphone (embodying my invention) shown in Figs. 22-25. Fig. 22 shows a section through the casing, the operative parts and the cover being removed. Fig. 23 is a section through  
55 the microphone box carrying the working parts of the microphone. Fig. 24 is a section through the cover. Fig. 25 is a plan view of the microphone box.

In the modification the working parts are marked with the same reference character as  
60 in Figs. 1-4. The diaphragm 1 is secured to the frame or box 50 carrying the other working parts by means of a ring 51 of angular cross section. This ring may be held  
65 by friction or by screw threads on the cir-

cumference of the box. The latter may be provided with screwthreads 52 corresponding with screwthreads 53 on the inside of the casing 54 or it may be held in the bottom of the casing simply by friction. The  
70 cover 55 is after the insertion of the microphone box screwed on the same, whereby the contact springs 56 of the carbon box are pressed against the contact piece 57 on the inside of the cover. 58 is an electric connection between the boss of the lever and the  
75 microphone box or frame. This connection has proved useful for the reason that the electrical connection afforded by the bearing points of the lever is of such nature that it  
80 creates considerable resistance and therefore has disturbing effects on the microphone action. In this modification I have shown a carbon box of an oval form, which form has been found preferable for the following reason. When the electrode is carried by a lever as in the present invention the electrode will have a greater movement at its outer than at its inner end. This is to some degree a disadvantage and by making its radial dimension small and enlarging it sideways this disadvantage is lessened. In this figure as well as in Fig. 1 it will be seen that the carbon box with the electrodes is so disposed that the inward movement of the diaphragm causes the movable electrode to move out from the box, that is to say the pressure on the carbon grains is decreased, whereas in the usual arrangement this pressure is increased, when the diaphragm through the sound waves is moved inwardly. This difference from the usual arrangement improves the sensibility of the microphone.

In Figs. 26 to 29 I have shown a special form of electrodes, which I have found preferable in connection with this invention.

In the form shown in Figs. 26 and 27 the electrode has a ribbed surface, the ribs being arranged in a direction so as to extend horizontally when the microphone is used, and having in cross-section a sawtooth-like form with the sloping face turned upward. With this form the static pressure becomes less.

In the form of Figs. 28 and 29 corrugated electrodes are shown having the corrugations so disposed as to extend vertically when the microphone is used. In this form the corrugations in the two opposed electrodes have a peculiar form so as to secure the same distance between the two corrugated surfaces throughout their extent. To this end the bottom of each corrugation has a round form as shown, the center of the arc being in the point of the opposed corrugation. In this manner I secure a greater efficiency of the electrodes because the whole surface gets active and no dead corners are created as when the corrugations have a pointed shape at the bottom.

I do not limit myself to the manner of



carrying out or using my invention as specified above. Lever mechanisms according to the present invention may be used to produce vibrations in electrical, optical or other apparatus by means of diaphragms or chords adapted to have oscillatory movements imparted thereto by sounding bodies. In this way desired synchronous effects may be realized by very simple means.

Instead of connecting, as above stated, a single diaphragm or other primarily oscillating member with a plurality of operative organs, one may inversely connect a plurality of primarily oscillating organs with a single operative member (or with a plurality of such members).

As regards the way of carrying out the invention it may be stated that a lever system may be composed of different materials so as to use, for example, a heavier material for the oscillating body with great mass concentrated around the oscillatory axis. It would also be possible to construct the entire oscillatory body as a body of revolution with a central portion of great mass and whose peripheral parts where the points of contact for the diaphragm or other oscillating members are located, may be in the form of a disk of light construction.

When microphones according to the present invention are constructed for use on long lines, they may be provided with means whereby the action of the lever system may be lessened or neutralized. This may be done, for example, by means of pressure exerted on the diaphragm around its center, or by pressure on the lever or the oscillating body. It may also be done by an electrical resistance which is inserted in series or in parallel with the secondary conductor, or simply by employing a device similar to the so-called Iris-diaphragm used in photographic cameras.

What I claim is:

1. In a device of the character specified, the combination with a primary oscillating member, of means for transmitting or transforming the oscillations of said member, a lever interposed between said member and said means comprising a lever arm having one of its ends attached to said means and an enlargement at the other end of said arm, said enlargement being a body of great mass relatively to the mass of the lever, means to pivotally support said enlargement substantially at the center of gravity of the lever system and a connection between said lever and said primary oscillating member.

2. In a device of the character specified, the combination with a primary oscillating member, of means for transmitting or transforming the oscillations of said member, a lever interposed between said member and said means comprising a lever arm having one of its ends attached to said means and

an enlargement at the other end of said arm, said enlargement being a body of great mass relatively to the mass of the lever, means to pivotally support said enlargement substantially at the center of gravity of said enlargement and a connection between said lever and said primary oscillating member.

3. In a device of the character specified, the combination with a primary oscillating member, of means for transmitting or transforming the oscillations of said member, a lever interposed between said member and said means comprising a lever arm having one of its ends attached to said means and an enlargement at the other end of said arm said enlargement being a body of great mass relatively to the mass of the lever, yieldingly supported bearings by which said enlargement is pivotally carried, and a connection between said lever and said primary oscillating member.

4. In a device of the character specified, the combination with a primary oscillating member, of electrodes for transmitting or transforming the oscillations of said member, a lever interposed between said member and said electrodes, said lever comprising a lever arm having one of its ends contacting with one of said electrodes and an enlargement at its opposite end said enlargement being a body of great mass relatively to the mass of the lever, yieldingly supported bearings in which said enlargement is pivotally carried, and a connection between said lever and said primary oscillating member.

5. In a device of the character specified, the combination with an oscillatory diaphragm, of means for transmitting or transforming the oscillations of said diaphragm, a lever interposed between said diaphragm and said means, said lever comprising a lever arm having one of its ends contacting with said means and an enlargement at its opposite end said enlargement being a body of great mass relatively to the mass of the lever, yieldingly supported bearings in which said enlargement is pivotally carried, and a spring actuated contact connection between said lever and said diaphragm.

6. In a device of the character specified, the combination with an oscillatory diaphragm, of means for transmitting or transforming the oscillations of said diaphragm, said means including a movable electrode, a lever interposed between said diaphragm and said means, said lever comprising a lever arm having one of its ends attached to said movable electrode and an enlargement at its opposite end said enlargement being a body of great mass relatively to the mass of the lever, yieldingly supported bearings in which said enlargement is pivotally carried, and a spring actuated contact connection between said lever and said diaphragm.

7. In a device of the character specified,

the combination with a primary oscillating member, of means for transmitting or transforming the oscillations of said member, a lever interposed between said member and  
 5 said means comprising a lever arm having one of its ends attached to said means and an enlargement at the other end of said arm said enlargement being a body of great mass relatively to the mass of the lever, yieldingly  
 10 supported bearings by which said enlargement is pivotally carried, and a spring actuated contact connection between said lever and said primary oscillating member, said connection comprising a hook secured to said  
 15 primary oscillating member in which hook said lever arm is supported.

8. In a device of the character specified, the combination with a primary oscillating member, of means for transmitting or transforming the oscillations of said member, a lever interposed between said member and  
 20 said means comprising a lever arm having one of its ends attached to said means and an enlargement at the other end of said arm  
 25 said enlargement being a body of great mass relatively to the mass of the lever, yieldingly supported bearings by which said enlargement is pivotally carried, a connection between said lever and said primary oscillating  
 30 member, said connection comprising a hook secured to said primary oscillating member in which hook said lever arm is supported, and means for yieldingly pressing said lever arm against said hook.

35 9. In a device of the character specified, the combination with a primary oscillating member, of means for transmitting or transforming the oscillations of said member, a lever interposed between said member and  
 40 said means comprising a lever arm having one of its ends attached to said means and an enlargement at the other end of said arm, yieldingly supported bearings by which said

enlargement is pivotally carried, and a connection between said lever and said primary  
 45 oscillating member, said connection comprising a hook portion secured to said primary oscillating member in which hook portion said lever arm is supported, and a screw and nut member adapted to engage said hook  
 50 portion.

10. A telephone transmitter or microphone, comprising a diaphragm, a lever having one of its ends enlarged and of great mass relatively to the body of the lever, a  
 55 pivotal support for the enlarged end of said lever, a connection between the diaphragm and the lever whereby the oscillations of the former are imparted to the latter, and means for transforming the oscillations of the lever  
 60 into varied electric currents, said means comprising granulated carbon and oblong or oval electrodes in contact with said carbon.

11. In a device of the character specified, 65 the combination with a primary oscillating member, of means for transmitting or transforming the oscillations of said member, a lever interposed between said member and said means comprising a lever arm having  
 70 one of its ends attached to said means and an enlargement at the other end of said arm said enlargement being a body of great mass relatively to the mass of the lever, a connection between said lever and said primary os- 75  
 cillating member and yieldingly supported bearings by which said enlargement is pivotally carried, said bearings consisting of pointed pins bearing against diaphragms.

In testimony that I claim the foregoing as  
 80 my invention, I have signed my name in presence of two subscribing witnesses.

JONAS ALBERT JOHNSEN.

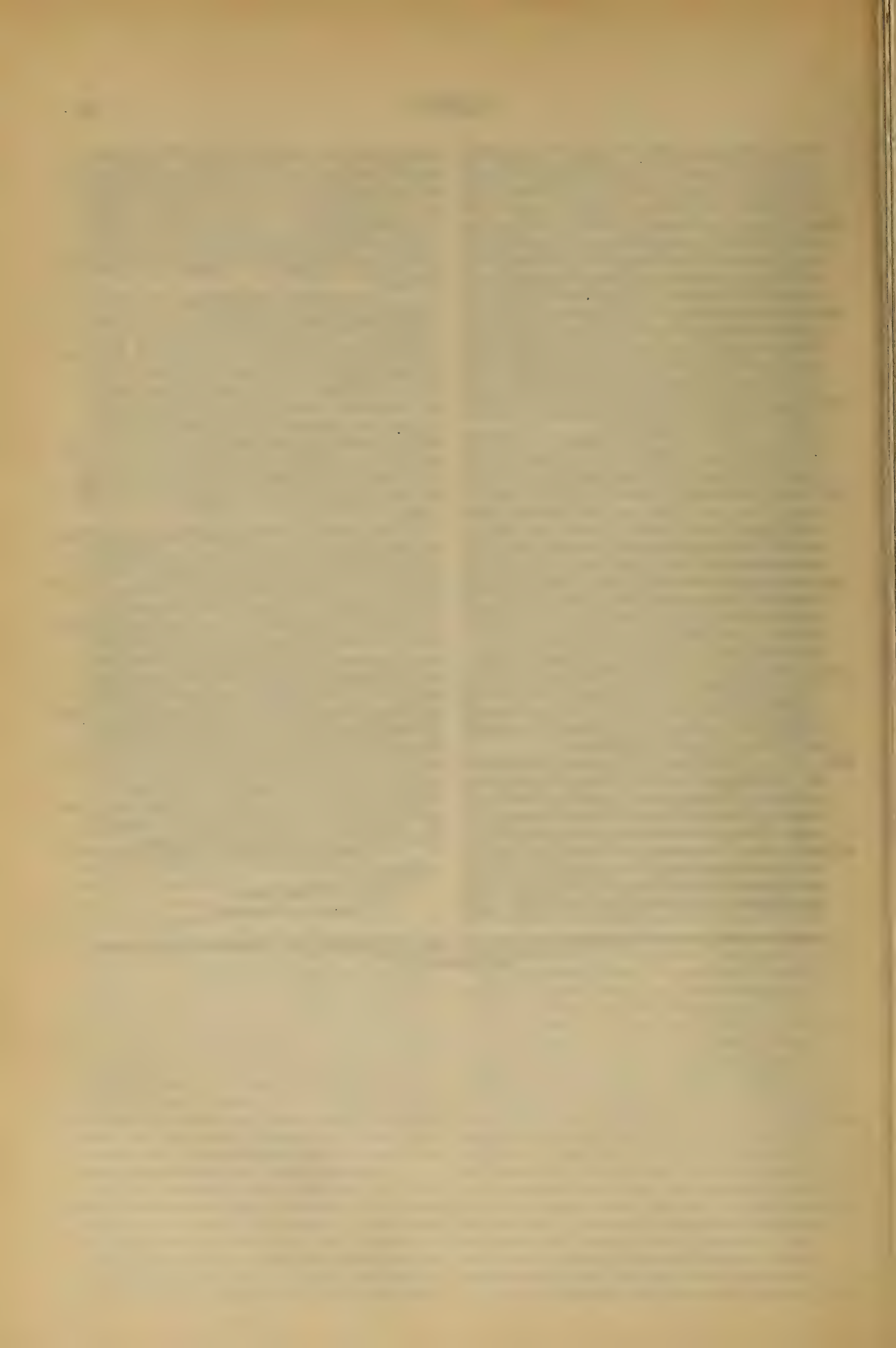
Witnesses:

H. E. GUTTORSEN,

C. FABRICIUS HANSEN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





STOP MECHANISM FOR TALKING  
MACHINES,

#1,229,642-----H. H. Murray,  
Patented-June 12th, 1917.  
Filed-May 13th, 1914.

H. H. MURRAY.  
STOP MECHANISM FOR TALKING MACHINES.  
APPLICATION FILED MAY 13, 1914.

1,229,642.

Patented June 12, 1917.  
4 SHEETS—SHEET 1.

Fig. 1.

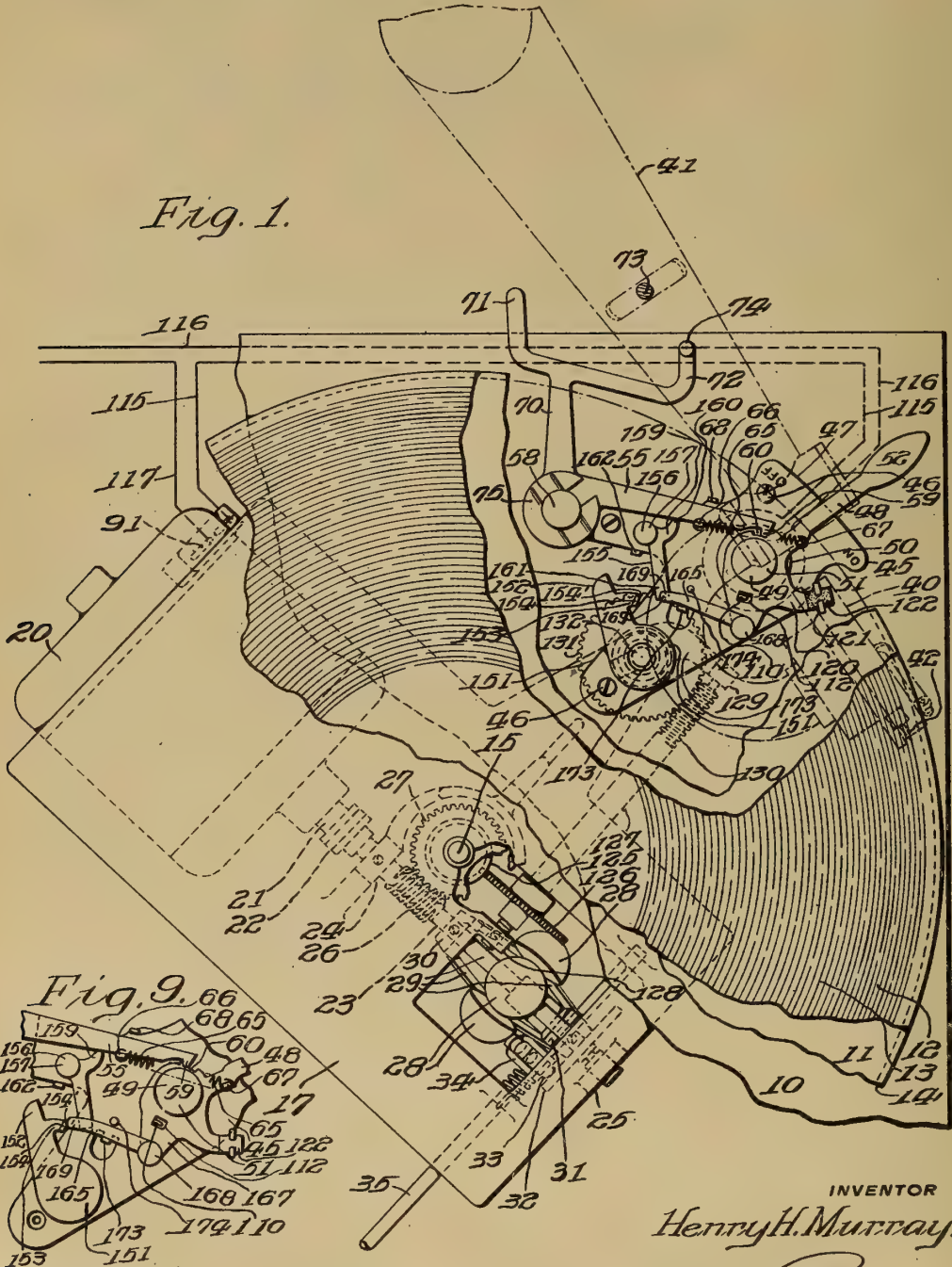
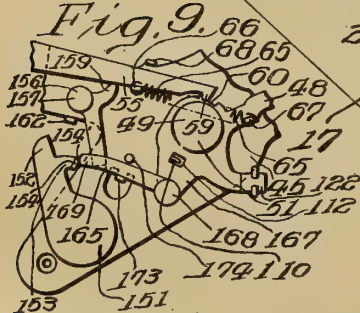


Fig. 9.



WITNESSES

H. J. Hartman.

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1,229,642.

4 SHEETS—SHEET 2.



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STOP MECHANISM FOR TALKING MACHINES.  
APPLICATION FILED MAY 13, 1914.

1,229,642.

Patented June 12, 1917.  
4 SHEETS—SHEET 3.

Fig. 5.

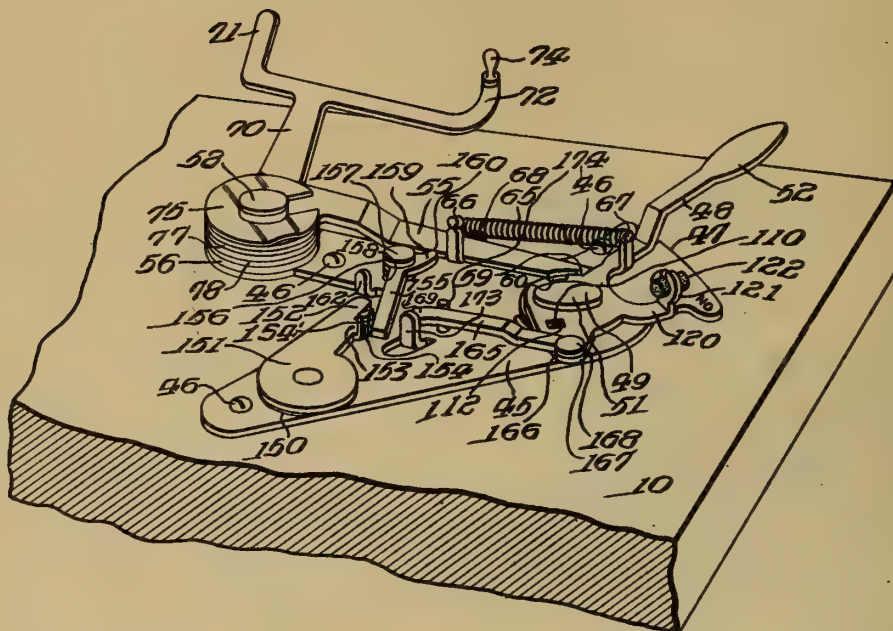
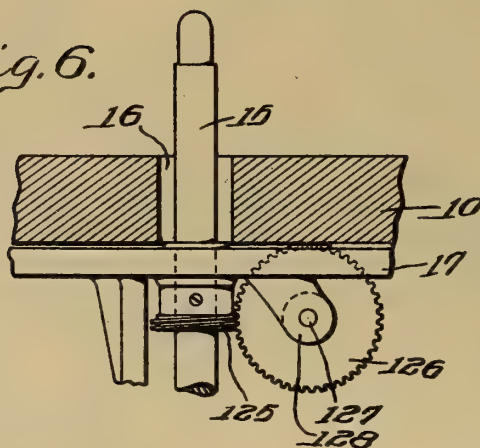


Fig. 6.



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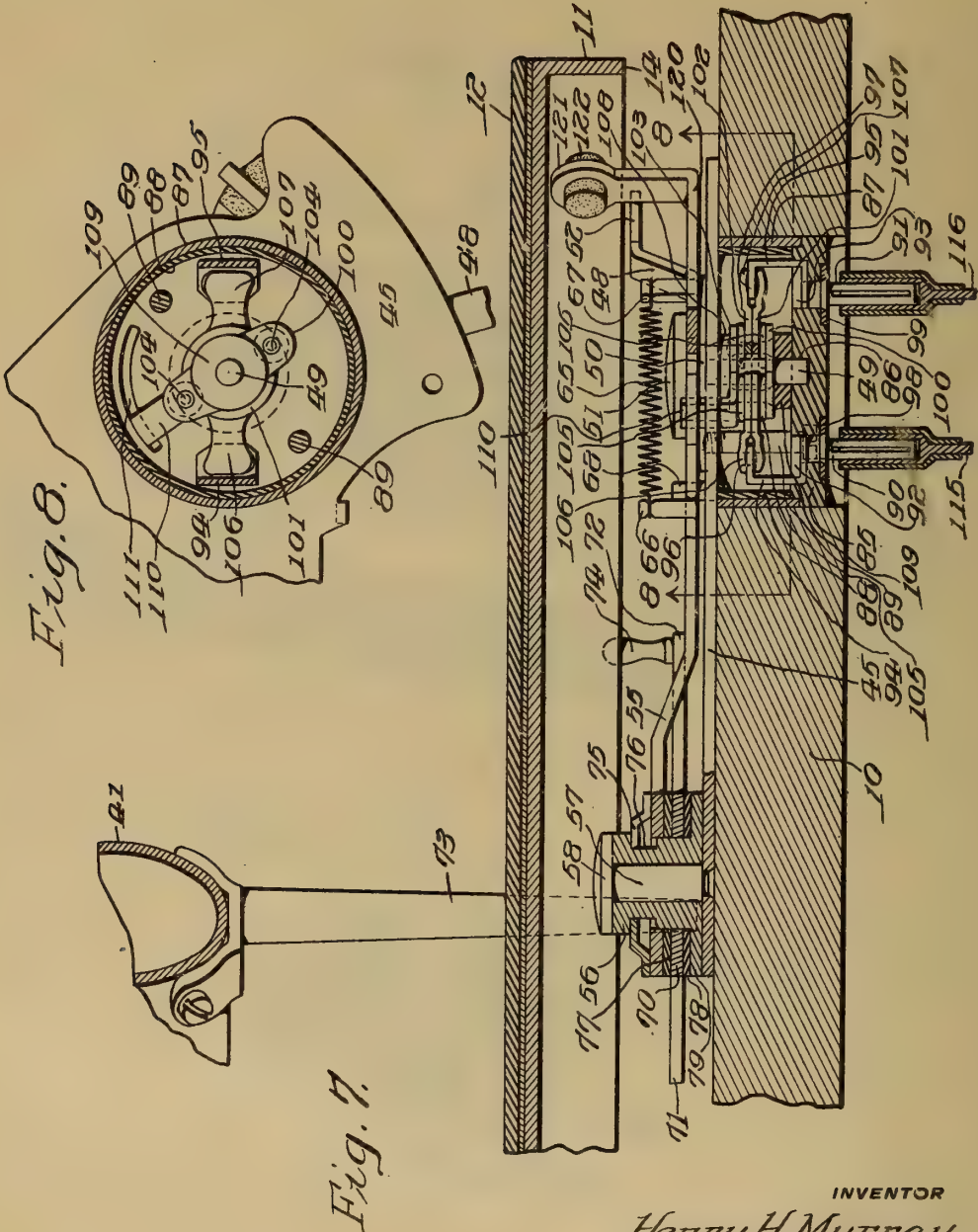
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# UNITED STATES PATENT OFFICE.

HENRY H. MURRAY, OF RIVERTON, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

## STOP MECHANISM FOR TALKING-MACHINES.

1,229,642.

Specification of Letters Patent.

Patented June 12, 1917.

Application filed May 13, 1914. Serial No. 838,241.

*To all whom it may concern:*

Be it known that I, HENRY H. MURRAY, a citizen of the United States, and a resident of Riverton, county of Burlington and State of New Jersey, have invented certain new and useful Improvements in Stop Mechanisms for Talking-Machines, of which the following is a specification.

One object of this invention is to provide in a talking machine improved automatic means for stopping the same; and more specifically to provide in a talking machine including a rotary record support, an electric motor for actuating the same, and sound reproducing means arranged to cooperate with a record on the support, a switch for controlling the motor, a brake for stopping the record support, automatic means controlled by a relative movement between the sound reproducing means and a record on the support adjustable to actuate the switch and the brake to stop the motor and the record support upon the completion of the reproduction of the sounds recorded on the record, and secondary automatic means actuated by the motor independently of the position of the sound reproducing means, to actuate the switch and the brake after the motor has been in operation for a predetermined period, slightly greater than would be required to reproduce the sounds from the largest record for which the machine is designed, to prevent the motor from being unintentionally operated through an indefinite period.

Further objects of this invention will appear hereinafter.

In the accompanying drawings, Figure 1 is a fragmentary top plan view of a talking machine constructed in accordance with this invention, with the parts shown as they appear at the beginning of the operation of the talking machine in reproducing sounds from a record; Fig. 2 a fragmentary top plan view of the same, but showing the parts as they appear upon the completion of the reproduction of sound from the record, and after the operation of the machine has been stopped automatically by the move-

ment of the sound reproducing means; Fig. 3 a fragmentary top plan view of the same, but showing the parts as they appear after the operation of the talking machine has been stopped, independently of the movement of the sound reproducing means by secondary stopping means forming a part of this invention; Fig. 4 a vertical section on line 4-4 of Fig. 2; Fig. 5 a fragmentary perspective of the automatic stopping mechanism forming a part of this invention with the parts in the positions illustrated in Fig. 3; Fig. 6 an enlarged fragmentary vertical section of a part of the same; Fig. 7 an enlarged fragmentary vertical section on line 7-7 of Fig. 2 with parts omitted for clearness; Fig. 8 a horizontal section on line 8-8 of Fig. 7, with parts omitted for clearness, and Fig. 9 a fragmentary top plan view of the secondary stopping means.

Referring to the drawings, one embodiment of this invention comprises a talking machine including the usual or any suitable cabinet providing a flat horizontal partition or support 10, spaced above which is a horizontal rotary disk record support 11, adapted to carry the usual or any suitable disk sound record 12, the record shown being provided on its upper surface with a spiral sound groove 13 of uniform depth and in the form of lateral undulations corresponding to sound waves. The record support 11 is provided with a marginal cylindrical flange or rim 14 depending therefrom and integral or otherwise rigid therewith, for a purpose that will appear hereinafter. The record support is carried by the upper end of a rotary spindle 15, which projects upwardly freely through an aperture 16 provided therefor in the support 10. The spindle 15 is mounted to rotate about a fixed vertical axis coincident with its longitudinal axis in suitable bearings depending from a rigid motor support 17 arranged beneath and secured to the horizontal support 10.

For rotating the record support 11, an electric motor 20 is arranged beneath the horizontal support 10 and is rigidly secured to the motor support 17 in any suitable man-



ner. The motor 20 is provided with a horizontal driving shaft 21, which rotates about a fixed horizontal axis, and which is terminally connected by any suitable coupling 5 22 with a horizontal driving spindle 23 in alinement therewith, and which is mounted to rotate about a fixed horizontal axis in suitable bearings 24, and 25, depending from and rigid with the motor frame 17, the 10 spindle 23 being held against longitudinal movement in any suitable manner. Rigidly mounted upon or integral with the spindle 23 and coaxial therewith is a worm 26 which engages a worm gear 27 rigid and coaxial 15 with the vertical spindle 15, whereby the spindle 15 is rotated to rotate the record support.

Mounted upon the horizontal spindle 23 is a governor including balls 28 carried by 20 springs 29, secured to a collar 30 fixed on the driving spindle 23, and to a sleeve 31 slidable longitudinally of the driving spindle 23, and carrying fixed thereon a friction disk 32 which engages a friction pad 33 25 carried by an arm 34 rigid with a shaft 35, which is rotatively adjustable by well known means (not shown) to cause the motor and record support to rotate at a predetermined rate.

30 Above the record 12 is the usual or any suitable sound box or sound reproducer 40, which is connected to the smaller end of a hollow tapering tone arm 41 to communicate therewith, and to swing across the record 12, 35 the tone arm being supported at its larger end by well known means (not shown) to swing about a fixed vertical axis. The sound box 40 is provided with the usual or any suitable stylus 42 arranged to cooperate 40 with the sound record 12 by engagement in the undulatory sound groove 13 for propelling the sound box across the record to reproduce the sounds recorded upon the record.

45 For starting or stopping the rotation of the record support 11, and the record 12 carried thereby, automatic means are provided which are preferably arranged mainly upon the upper surface of the horizontal 50 partition or support 10 and beneath the rotary record support 11 and comprising a substantially flat horizontal base plate 45 which is rigidly secured by means of screws 46 or otherwise to the upper surface of the 55 horizontal support 10, the major portion of the base plate being beneath the record support 12, but one edge of the base plate projecting slightly laterally outwardly from the margin of the record support as at 47 in 60 order to display the words "on" and "off" or other suitable lettering which may be impressed into the upper surface of this projecting portion of the base plate for a purpose which will appear hereinafter.

Arranged slightly above the base plate 45 65 is a switch and brake lever 48 which is mounted to oscillate about a fixed vertical pivot 49 extending snugly through an aperture provided therefor in the base plate, a washer 50 being preferably interposed 70 around the pivot 49 between and in contact with the under surface of the switch lever 48 and the upper surface of the base plate 45, and the pivot 49 being preferably provided 75 above the switch lever with a head 51 having a flat under surface which engages against the upper surface of the switch lever to hold the switch lever rotatably in position. The switch lever 48 extends from the pivot 49 outwardly beneath 80 the marginal flange 14 of the record support, and terminates in an upwardly off-set portion extending outwardly from the record support and forming a handle 52.

For holding the switch lever 48 in an op- 85 erative position to cause the rotation of the record support, a horizontally extending latch 55 is mounted at one end to oscillate about a fixed vertical axis upon a sleeve 56, which is rotatably mounted on a vertical 90 pivot 57, the lower end of which is rigidly secured to the base plate 45, and the upper end of which is provided with a head 58, the under surface of which engages against the upper end of the sleeve 56 to prevent 95 upward movement of the sleeve. The free end of the latch 55 is provided with a laterally projecting outwardly tapering tooth 59 arranged to engage in a correspondingly tapered notch 60 provided there- 100 for in the edge of the switch lever 48 adjacent its pivot 49, and the arrangement is such that when the tooth 59 is in the notch 60 the switch lever 48 is held in an operative or "on" position, as shown in Fig. 1, to 105 cause the rotation of the record support, as will appear hereinafter.

For performing the double function of holding the tooth 59 of the latch 55 in engagement with the notch 60 of the switch 110 lever 48, and of swinging the switch lever 48 anti-clockwise from an operative or "on" to an inoperative or "off" position, when the latch 55 is released from engagement with the switch lever 48, a spiral spring 65 or 115 other resilient means is secured at one end to a lug 66 projecting upwardly from the latch 55, while the other end of the said spring is attached to a lug 67 which is preferably integral with the switch lever 48. 120 These lugs 66 and 67 are so positioned that when the tooth 59 is in engagement with its notch 60, as shown in Fig. 1, the longitudinal axis or line of action of the spiral spring 65 is spaced slightly in front of the tooth 125 59, and between the tooth 59 and the longitudinal axis of the vertical pivot 49, and between the tooth 59 and the axis of oscilla-



tion of the latch 55, and extends in a direction nearly radial with respect to the axis of oscillation of the latch 55. In this position the spring acts to hold the tooth 59 in engagement in its notch 60, but by swinging the latch 55 through a small arc anti-clockwise, the spring will act effectively to rotate the switch lever 48 anti-clockwise into an inoperative or "off" position, as shown in Figs. 2, 3 and 5. In the latter position the spring 65 acts to hold the rear edge of the free end of the latch 55 lightly in engagement with a fixed stop 68 provided therefor and projecting upwardly from the base plate 45, and maintains the tooth 59 in such a position that only a slight rotary movement clockwise is necessary to bring it into operative engagement in its notch 60 after the switch lever has been rotated manually to bring the notch into alinement with the tooth.

When the tooth 59 is in engagement in its notch 60, it may be released or thrown out of engagement at any time by a slight pressure anti-clockwise exerted manually or otherwise upon the switch lever 48, in addition to the pull of the spring 65, the outer side edge of the tooth and the corresponding wall of the notch being inclined in a suitable direction to produce this effect, and when the tooth 59 is out of engagement with its notch and in its normal inoperative position, as shown in Figs. 2, 3 and 5, it may be brought into engagement in the notch simply by manually rotating the switch lever 48 clockwise. The inner side edge of the tooth 59 and the corresponding wall of the notch 60 are preferably so shaped as to maintain the tooth in engagement in the notch against any pressure that may be applied clockwise to the switch lever 48.

For automatically releasing the latch 55 from engagement with the switch lever 48 a horizontally extending arm 70 is mounted at one end to rotate about a vertical axis upon the sleeve 56, and projects from the sleeve rearwardly and terminates in the rear of the margin of the record support 11 in a bifurcated end forming two fingers 71 and 72. The inner end of one, 71, of these fingers is arranged to be engaged and actuated by the lower end of a vertical stud 73, which is rigidly secured at its upper end to the under side of the tapering tone arm 41. The other finger 72 of the arm 70 is preferably provided at its outer end with an upwardly extending stud 74 in the form of a handle for the convenient manual operation or adjustment of the arm 70.

To transmit motion from the arm 70 to the latch 55, and at the same time to permit of the adjustment of the arm 70 rotatably with respect to the latch 55, to bring the finger 71 into position to be engaged by the

stud 73 at any desired position, the arm 70 and the latch 55 are preferably yieldingly clamped in a predetermined relationship by means of a yielding split washer or U-shaped spring clip 75, made of spring steel, or other suitable material. The spring clip 75, when in operative position, partially surrounds the sleeve 56, coaxial therewith, and engages against and is held in position by the walls of an annular groove 76, provided therefor in the sleeve 56. This clip 75 is normally in contact with and presses downwardly against the upper surface of the corresponding end of the latch 55, which is preferably arranged above the corresponding end of the arm 70. A washer 77 of fiber or other suitable material is preferably placed around the sleeve 56, between the adjacent ends of the latch 55 and the arm 70, and a similar washer 78 is interposed around the sleeve 56 and between the under surface of the corresponding end of the arm 70, and an annular flange 79 which projects outwardly from the lower end of the sleeve 56, preferably integral therewith and the lower surface of which rests against the upper surface of the base plate 45. The arm 70, the latch 55 and the washers 77 and 78 are preferably rotatable with respect to the sleeve 56, but are normally clamped in predetermined positions with respect to the sleeve by the spring clip 75, with a force sufficient to hold these parts in fixed relationship under the action of the tone arm when being carried across a record by means of the stylus engaging in the record groove. The arm 70 may, however, be rotated manually with respect to the sleeve 56, and the latch 55, by exerting a force on the handle 74 slightly in excess of the force exerted by the tone arm in coöperating with the finger 71 to disengage the tooth 59 from its notch 60.

For automatically controlling the electric motor 20 there is arranged beneath and depending from the base plate 45 and coaxial with the pivot 49, an electric switch comprising a flat circular horizontal base 85, of fiber or other insulating material, the upper surface of which is provided centrally with a circular recess 86, in which snugly fits the lower end of the vertical pivot 49 of the switch lever 48. The base 85 is surrounded by a suitable vertical cylindrical switch casing 87, which may be provided with a suitable lining 88 of insulating material, and which fits snugly in a cylindrical aperture provided therefor in the horizontal partition 10. The lower end of the casing 87 fits snugly in an annular marginal recess provided therefor in the upper surface of the circular base, and the base 85 and casing 87 are clamped in fixed relationship by means of vertical screws 89 extending



through the base and threaded into the base plate 45.

Within the casing 87 and mounted upon and projecting through the circular base 85, are a pair of stationary brass binding or terminal posts 90 and 91, the upper ends of which are provided with flat rectangular heads 92 and 93, which are held against rotation in rectangular recesses provided therefor in the upper surface of the circular base 85, and clamped downwardly upon the lower portions of two brass plates 94 and 95, which are bent upwardly from the heads and then inwardly to form two diametrically opposed stationary horizontal contacts 96 and 97. Stationary brass bushings 98 and 99 may be arranged in recesses provided therefor in the under side of the circular base 85 and surrounding the binding posts 90 and 91 respectively. Surrounding the fixed vertical pivot 49 and within the casing 87, is a rotatable switch member comprising four superimposed plates 100, 101, 102 and 103, each of which is held in fixed relationship with respect to each other by means of two vertical rivets 104, the bottom plate 100 and the top plate 103 fitting snugly but rotatably on the vertical pivot 49 and being spaced and insulated from the intermediate plates 101 and 102 by means of washers 105 of insulating material surrounding the rivets 104. The intermediate plates 101 and 102 are clamped together between the washers 105 and provided with suitable apertures to keep these intermediate plates out of contact with and insulated from the rivets 104 and the vertical pivot 49. These intermediate plates 101 and 102 are preferably made of spring copper or brass or other resilient conducting means, and are bent apart at their ends to form two pairs 106 and 107 of movable contacts arranged to embrace and cooperate in the usual manner with the stationary contacts 96 and 97 of the switch. The plates 101 to 104 are held against movement longitudinally of the pivot 49 by means of suitable washers 108 and 109 preferably of insulating material, surrounding the pivot 49 between the top plate 103 and the under surface of the base plate 45, and between the bottom plate 100 and the upper surface of the circular base 85 respectively. For rotating the movable contacts 106 and 107 of the switch, the top plate 103 is provided with a vertical extension 110, which projects loosely through a segmental slot 111 in the base plate 45 coaxial with the vertical pivot 49 and engages in an aperture 112 provided therefor in an extension of the switch lever 48. A flexible electric conductor 115 extends from the binding post 90 to the motor, for supplying the motor with an electric current, and a flexible electric conductor 116 extends from the

binding post 91 to a source of electric current. A flexible electric return conductor 117 from the motor to the source of electric current completes the motor circuit when the movable contacts 106 and 107 of the switch are in engagement with the stationary contacts 96 and 97.

For stopping the rotation of the record support 11 substantially at the same time that the switch lever 48 is rotated anti-clockwise either automatically or manually to break the circuit of the motor 20, the switch lever 48 is provided with a lateral extension 120, the outer end of which is bent upwardly to form a vertical projection as at 121, which is provided with a suitable yielding brake pad 122 secured thereto in any suitable manner and arranged to engage against the inner cylindrical surface of the marginal flange 14 of the record support 11 when the switch lever 48 is in an inoperative position with the tooth 59 of the latch 55 out of engagement with its notch 60, the brake pad 122 being pressed against the marginal flange 14 when in this position by the action of the spring 65, and the brake pad 122 holding the switch lever 48 just out of engagement with the free end of the latch 55.

To prevent the motor from being unintentionally operated through an indefinite period, auxiliary automatic mechanism is provided, which operates independently of the position of the sound box with respect to the record, to release the tooth 59 of the latch 55 from its notch 60 to break the motor circuit and to apply the brake after the motor has been in operation continuously at any time for a period slightly greater than would be required to reproduce the sounds from the largest record for which the talking machine is designed.

One embodiment of the secondary automatic mechanism comprises a worm 125 coaxial with and rigidly secured to the vertical end of the spindle 15, which carries the record support. This worm 125 is preferably arranged beneath and in engagement with the rigid motor support 17, and engages a corresponding worm gear 126 which is coaxial with and rigidly mounted upon a horizontal rotary shaft 127, adjacent one end thereof. This shaft 127 is terminally supported in suitable stationary bearings 128 and 129, which depend from and are rigidly secured to the motor support 17, the shaft 127 being held against longitudinal movement in any suitable manner. The end of the shaft 127 opposite the worm gear 126 is provided with a worm 130 coaxial and rigid therewith which engages a horizontal worm gear 131, which is loosely mounted upon the lower portion and adjacent the lower end of a vertical ro-



tary spindle 132, which projects upwardly therefrom and snugly but rotatably through a cylindrical aperture or bearing provided therefor in the motor support 17. The upper end of the spindle 132 is spaced slightly below the under surface of the base plate 45 and extends into a vertical cylindrical aperture 133 provided in the horizontal partition 10. The spindle 132 is held against upward movement by means of a flat annular flange 134 integral or otherwise rigid therewith which bears rotatably against the under surface of the motor support 17, and is held against downward movement by means of a collar 135, which surrounds the spindle and bears against the upper surface of the support 17, and which is rigidly but detachably secured to the spindle by means of a horizontal pin 136 extending diametrically through the collar and the spindle.

Surrounding the spindle 132 and clamped between its flange 134 and the worm gear 131, is a washer 137 of fiber or other similar suitable material to hold the worm gear 131 frictionally against rotation with respect to its rotary spindle 132 while the worm gear is performing its function in the automatic operation of the device, and at the same time to permit of the adjustment of the spindle 132 rotatively with respect to the worm gear 131 for a purpose which will appear hereinafter. The worm gear 131 is clamped yieldingly in position against the under surface of the washer 137 by means of a spring clip 138 which surrounds the spindle 132 and engages in an annular recess 139 provided therefor in the lower end of the spindle. This spring clip 138 is similar in construction to the spring clip 75 hereinbefore described and performs a similar function by bearing against the under surface of the worm gear 131 and clamping the worm gear and washer 137 against the flange 134 with sufficient force to hold the worm gear rotatively in fixed position with respect to its spindle 132 while the worm gear is performing its function, but permitting of the adjustment of the spindle 132 rotatively with respect to the worm gear 131 by a manual pressure in a horizontal direction against the free end of the crank plate 151, slightly greater than the pressure exerted by the free end of the crank plate in performing its function, as will appear hereinafter.

Loosely surrounding the upper end of the spindle 132 is a tubular universal coupling 145, which is connected to the spindle by a horizontal pivot 146 to oscillate slightly with respect thereto. The upper end of the coupling 145 engages loosely in a cylindrical recess provided therefor in the lower end of a vertical rotary hub 147, and is con-

nected to the hub to oscillate slightly with respect thereto by means of a pivot 147'. The hub 147 projects upwardly snugly but rotatably through the base plate 45, and is provided with two upwardly facing annular shoulders 148 and 149, the lower one of which engages against the lower surface of the base plate 45, and the upper one of which is in a plane slightly above the upper surface of the base plate 45. Surrounding the upper smallest portion of the hub above and engaging against the upper shoulder 149, is a circular washer 150, and surrounding and rigidly connected to the hub above and in contact with the washer 150 is the crank plate 151. The main portion of this crank plate 151 is arranged in a horizontal plane and projects from the hub 147 toward the latch 55 forming a free end 152 spaced from the latch. Adjacent its free end 152 the crank plate 151 is provided with a lateral extension 153, integral therewith, and the outer portion of which is turned upwardly to form a vertical lug 154, which preferably has a beveled edge 154'.

For transmitting motion from the crank plate 151 to the latch 55, to release the latch, a horizontal bell crank 155 is arranged between the crank plate 151 and the front edge of the latch 55. This bell crank 155 is arranged to oscillate about a fixed vertical pivot 156, which is rigidly secured at its lower end to the base plate 45, and which is provided at its upper end with a head 157, which engages against the upper side of the bell crank 155. A washer 158 is preferably interposed around the pivot 156 between the bell crank 155 and the base plate 45, to hold the bell crank slightly above the upper surface of the base plate and in a plane with the crank plate 151. The inner end 159 of the bell crank 155 is arranged to normally engage the front edge of the latch 55 as at 160, and the front end 161 of the bell crank is arranged to be always in the path of the beveled edge 154' of the lug 154 of the crank plate 151. The bell crank 155 has only a small amount of free rotary movement, the rotation of the bell crank in a clockwise direction being limited by a fixed stop 162, which projects upwardly from the base plate 45 and preferably integral therewith, and which is arranged to engage a side edge of the front portion of the bell crank 155, and the rotation of the bell crank 155 anticlockwise being limited by the front edge of the latch 55, when the rear edge of the latch is in engagement with its stop 68.

To reset the crank plate 151 after it has performed its function of automatically releasing the switch lever 48, as just described, a push bar 165 is mounted to oscillate about a vertical pivot 166 extending through one end of the push bar and rigidly secured at its



lower end to an arm 167 projecting forwardly from the switch lever 48 and preferably integral therewith, the upper end of the pivot 166 being provided with a head 168 bearing against the upper surface of the push bar 165 to hold the push bar slidably in engagement with the upper surface of the arm 167. The inner portion of the push bar is flat and horizontal and the outer portion of the push bar is also flat and horizontal but is offset slightly upwardly from the inner portion so that the under surface of the outer portion is in a horizontal plane slightly above the plane of the upper surface of the bell crank 155 and intersecting the lug 154 of the crank plate. The free end 169 of the push bar 165 is guided to move approximately in a predetermined path by means of two fixed lugs 173 and 174, spaced upon opposite sides of the push bar 165 and projecting upwardly from the base plate 45.

When the switch lever 48 is in an "off" position at the limit of the anti-clockwise movement, as shown in Figs. 2, 3, and 5, and when the crank plate 151 is in any position between its extreme inoperative or anti-clockwise position as shown in Figs. 1 and 9, and its extreme operative or clock-wise position as shown in Figs. 3 and 5, or in the latter position, the push bar 165 will be moved in response to the clockwise rotation of the lever 48 and guided by the fixed lugs 173 and 174 to engage the beveled edge 154' of the lug 154 and to rotate the crank plate anti-clockwise until the crank plate reaches its extreme inoperative position as shown in Fig. 9. During the first part of the clockwise movement of the switch lever 48, the tooth 59 is not in engagement with its notch 60, but during the remainder of the movement the tooth 59 engages in its notch 60, and the notch is made broad enough to permit of the rotation of the switch lever anti-clockwise through a suitable arc, while the tooth 59 is in its notch 60 to rotate the crank plate 151 anti-clockwise through an arc equal to the arc through which the crank plate would be rotated clockwise by the operation of the motor 20, through a predetermined period slightly greater than necessary to reproduce the sound from the largest record which the machine is designed to utilize. When the switch lever 48 has been thus rotated manually, or otherwise, into its extreme clockwise position as shown in Fig. 9, and is then released, it is returned by the action of the spiral spring 65 to its normal "on" position as shown in Fig. 1, and the crank plate is left in its extreme anti-clockwise position or initial inoperative position, thus spacing the free end of the push bar 165 from the lug 154.

In this secondary automatic mechanism, the worm 125 and its worm gear 126, the

worm 130 and its worm gear 131, the crank plate 151, push rod 165, bell crank 155, and other parts are so proportioned and arranged that when the crank plate 151 has been moved into its extreme anti-clockwise or initial inoperative position, as shown in Fig. 1, by moving the switch lever 48 into its "on" position, the rotary record support 11, will start to rotate, and the crank plate 151 will be rotated gradually clockwise with a predetermined angular velocity, having such a ratio to the angular velocity of rotation of the rotary record support 11 that the beveled edge 154' of the lug 154 of the crank plate 151 will be brought practically simultaneously into engagement with the front end 161 of the bell crank 155 and with the free end of the push bar 165 to effect the release of the tooth 59 from its notch 60, and to automatically break the motor circuit shortly after the rotary record support 11 has been rotating for a sufficiently long period to reproduce sounds from the longest record for which the machine is designed, provided that meanwhile the automatic release of the switch lever 48 has not been effected by the engagement of the stud 73, carried by the tone arm, with the finger 71 of the arm 70, as hereinbefore described.

When, however, the finger 71 of the arm 70 has been manually rotated independently of the latch 55 and set to be engaged by the stud 73 of the tone arm coincident with the completion of the reproduction of sounds from the record, the switch lever 48 will be automatically released from an "on" position and thrown into an "off" position just before the beveled edge 154' of the lug 154 of the crank plate 151 has been brought into contact with the front end 161 of the bell crank 155, as shown in Fig. 2.

In any case, after the crank plate 151 has been rotated clockwise from its predetermined extreme anti-clockwise position by the continuous operation of the motor 20 for any given period within the prescribed limit, it is evident that the crank plate 151 will be reset into its extreme anti-clockwise position by moving the switch lever 48 clockwise from its "off" position to a position at the opposite end of its path of motion, the spindle 132 being permitted to rotate anti-clockwise independently of its worm gear 131 through the yielding action of the spring clip 138 in cooperation with the fiber washer 137, which is provided to permit of this rotation or adjustment of the spindle 132 with respect to the worm gear 131, as hereinbefore described.

While this invention has been shown as applied in a talking machine in which the rotary record support is driven at a constant angular rate of rotation by a constant speed motor, it is evident that the invention might



also be applied to a talking machine in which the record support is driven at a constantly varying angular rate of rotation, either by a motor actuated at a constantly varying speed or by a motor actuated at a constant speed and connected to the record support by suitable transmission means, to produce a constant surface speed of the record at the point of engagement of the record by the stylus.

Although only a single form has been shown in which this invention may be embodied, it is evident that the invention is not limited in its application to the specific construction illustrated, but might be embodied in various other forms without departing from the spirit of the invention or the scope of the appended claims.

Having thus described my invention, what I claim and desire to protect by Letters Patent of the United States is:

1. The combination with a rotary member, of a motor for actuating said member, an element arranged to move with respect to said member, means controlled by the movement of said element to cause the stoppage of said rotary member, and secondary means automatically actuated independently of said element, to stop said member.

2. The combination with a rotary member, of a motor for actuating said member, an element arranged to move with respect to said member, means controlled by the movement of said element to cause the stoppage of said rotary member, and secondary means automatically actuated independently of said element, to stop said member after said motor has been in continuous operation for a predetermined period.

3. The combination with a rotary member, of a motor for actuating said member, an element arranged to move with respect to said member, means controlled by the movement of said element to cause the stoppage of said rotary member, secondary means automatically actuated independently of said element to stop said member, means to reset said first-mentioned means, and means actuated by said means to also reset said secondary means.

4. The combination with a rotary member, of an electric motor for rotating the same, an element arranged to move with respect to said member, means controlled by the movement of said element to break the circuit current by which said motor is energized, and means automatically actuated independently of said element to break said circuit after said motor has been in continuous operation for a predetermined period.

5. The combination with a rotary member, of an electric motor for rotating the same, an element arranged to move with respect to said member and independently of

said motor, means controlled by the movement of said element to break the circuit by which said motor is energized, and means, automatically actuated independently of said element to break said circuit after said motor has been in continuous operation for a predetermined period.

6. The combination with a rotary member, of an electric motor for rotating the same, a brake for stopping said member, an element arranged to move with respect to said member, means controlled by the movement of said element to break the circuit by which said motor is energized, and to move said brake into an operative position to stop said member, and secondary means automatically operative independently of said element to break said circuit and actuate said brake after said rotary member has been continuously rotated through a predetermined number of revolutions.

7. The combination with a rotary member, of an electric motor for rotating the same, a brake for stopping said member, an element arranged to move with respect to said member, means controlled by the movement of said element to break the circuit by which said motor is energized, and to move said brake into an operative position to stop said member, and secondary means cooperating with said first-mentioned means and automatically operative independently of said element to break said circuit and actuate said brake after said rotary member has been continuously rotated through a predetermined number of revolutions.

8. The combination with a rotary member, of an electric motor for rotating the same, a brake for stopping said member, an element arranged to move with respect to said member, means controlled by the movement of said element to break the circuit by which said motor is energized, and to move said brake into an operative position to stop said member, secondary means cooperating with said first mentioned means and automatically operative independently of said element to break said circuit and actuate said brake after said rotary member has been continuously rotated through a predetermined number of revolutions, and means actuated by the movement of said brake from an operative position to an inoperative position for resetting said first-mentioned means and said secondary means respectively.

9. The combination with a traveling element, a rotary member and a motor for actuating the same, of means actuated by said traveling element to stop said motor when said element has reached the substantial limit of its travel, and secondary means, independent of said element, for stopping said motor in the event that said motor is per-

mitted to run for any considerable time longer than that required for said element to travel to the limit of its motion.

10. The combination with a traveling element, a rotary member and a motor for actuating the same, of means actuated by said traveling element to stop said motor when said element has reached the substantial limit of its travel, secondary means, independent of said element, for stopping said motor in the event that said motor is permitted to run for any considerable time

longer than that required for said element to travel to the limit of its motion, and means to substantially simultaneously reset said stopping means and said secondary means.

In witness whereof I have hereunto set my hand and seal the 12th day of May, A. D. 1914.

HENRY H. MURRAY.

Witnesses:

DAVID W. EVANS,

CHARLES F. WILLARD.

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PHONOGRAPH,  
 #1,229,749-----Newman H. Holland,  
 Patented-June 12th, 1917.  
 Filed-September 17th, 1914.





# UNITED STATES PATENT OFFICE.

NEWMAN H. HOLLAND, OF WEST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## PHONOGRAPH.

1,229,749.

Specification of Letters Patent. Patented June 12, 1917.

Application filed September 17, 1914. Serial No. 862,138.

*To all whom it may concern:*

Be it known that I, NEWMAN H. HOLLAND, a subject of the King of Great Britain, and a resident of West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs and more particularly to phonographs having telephonic connections whereby sounds may be recorded on a phonograph record blank from a more or less distant point and whereby the sounds or sound waves reproduced from the phonograph record may be transmitted to any desired distance. The principal object of my invention is to provide an improved device of the class described in which the sound reproducing means is rendered inoperative when the sound recording means is in position for operation, and vice versa, so that the possibility of interference of one of these means with the operation of the other is effectively eliminated and an increased efficiency of operation is obtained. Other objects of my invention will appear more fully in the following specification and appended claims.

In order that my invention may be more clearly understood, attention is hereby directed to the accompanying drawing forming a part of this specification and in which—

Figure 1 is a view partly in elevation, partly in section, and partly diagrammatic illustrating the preferred embodiment of my invention; and

Fig. 2 is a similar view of a modification.

In both of the figures, like parts are designated by the same reference numerals.

Referring to the drawing, the numeral 1 designates a traveling carrier arm to which the sound box body 2 is pivoted, as by a pivot screw 3 and a corresponding screw placed diametrically opposite the same. The sound box body 2 has a downwardly and rearwardly extending arm 4 to which arms 5 on opposite sides of the arm 4 are pivotally connected, as at 6, for up and down movement. A vibratory diaphragm 7 is mounted in a casing 8 which is carried by the arms 5, the interior of the casing 8 communicating with the interior of the sound box body 2 by means

of a hollow tubular connection 9. The specific construction thus far described is shown and described in detail in my co-pending application, Serial No. 831,695 filed April 14, 1914 and entitled Phonographs and is *per se* no part of the present invention. A recording stylus 10 and a reproducing stylus 11 are secured in any suitable manner to diaphragm 7, the reproducing stylus 11 being shown in engagement with the record surface 12 and the recording stylus 10 out of engagement with said surface. In order to facilitate the tilting of the sound box body 2 and the parts carried thereby about the axis of the pivots 3 so as to bring either stylus at will into engagement with the surface 12, I prefer to provide the carriage 1 with a sleeve-like guide 13 in which an operating member 14 is arranged to reciprocate longitudinally. The member 14 is provided with a slot 15 inclined to the direction of movement of the said member, this slot containing a pin 16 secured to a projection 17 extending upwardly from the sound box body 2. When the member 14 is moved from the position shown in Fig 1 toward the left, the pin 16 will ride upwardly in the slot 15, thereby causing the sound box to be tilted about the axis of the pivots 3 to move the stylus 11 out of engagement with the surface 12 and the stylus 10 into engagement with said surface. When the member 14 is again moved toward the right to the position shown in Fig. 1, the sound box will be tilted to move the stylus 10 out of engagement with the surface 12 and the stylus 11 into engagement with the said surface.

Communicating with the interior of the sound box body member 2 and extending upwardly from the same is a hollow tubular neck 18 having hollow tubular branches 19 and 20 extending laterally at an angle from the same. The branch 19 has mounted in the upper end thereof a telephone receiver 20' having the usual diaphragm 21 adapted to be set into vibration by the electromagnets 22' in the telephone circuit to be hereinafter described. The telephone receiver 20' has a passage 22 opening into the interior of the branch 19 so that the vibrations of the diaphragm 21 may be communicated to the diaphragm 7 by the air inclosed in the passage 22, the branch 19, the neck 18, and



the parts 2, 9 and 8. The branch 20 has mounted in the upper end thereof a telephone transmitter of suitable design. This transmitter may be constructed in the manner set forth in my copending application, Serial No. 767,261, filed May 13, 1913, and entitled Telephone transmitter. The said transmitter has an outwardly flaring passage 24 communicating with the interior of branch 20 so that the vibrations of the diaphragm 7 may be communicated to the diaphragm 25 by the air in the casing 8, the part 9, the sound box 2, the neck 18, the branch 20, and the passage 24.

The current for my improved apparatus may be supplied by any suitable source, such, for example, as a battery 26, one terminal of which is connected as by a conductor 27, to a switch member 28 which is secured to the sound box body 2. The other terminal of the battery may be connected to a conductor 29 which is electrically connected at the point 30 to a conductor 31, which connects the binding posts 32 and 33 on the receiver 20'' and the transmitter 23 respectively. The other binding post 34 on the transmitter 23 is electrically connected, as by a conductor 35 to a telephone receiver 37 which is likewise connected to a conductor 38 extending to a point adjacent to and above the switch member 28. The second binding post 39 of the receiver 20'' is electrically connected, as by a conductor 40, to a telephone transmitter 41 which is likewise connected to a conductor 42 extending to a point adjacent to and below the switch member 28. As shown in Fig. 1, the reproducing stylus is in operative position and the current flows from the battery 26 through the conductors 29 and 31 to the transmitter 23 and thence through the conductor 35 to the receiver 37 from which it flows through the conductor 38, the switch member 28, which is now electrically connected to the conductor 38, and the conductor 27 back to the battery 26. Accordingly, when the phonograph is set into operation to reproduce the record, the vibrations imparted to the diaphragm 7 through the stylus 11 cause the transmitter diaphragm 25 to be set into corresponding vibration and to transmit its vibrations to the receiver 37 which may be at any suitable distance from the phonographic apparatus. When the sound box body member 2 is tilted by the member 14 to bring the recording stylus 10 into engagement with the record surface 12 and to remove the reproducing stylus 11 from engagement with the record surface, the switch member 28 is moved out of electrical connection or engagement with the conductor 38 and into electrical connection or engagement with the conductor 42. The current from the battery 26 now flows through the conductors 29 and 31 to the receiver 20'', thence through

the conductor 40 to the transmitter 41 and thence through the conductor 42, the switch member 28 and the conductor 27 back to the battery 26. The transmitter 41 may be located at any suitable distance from the phonographic apparatus. With this arrangement of parts, undulations corresponding to the sound waves impressed upon the transmitter 41 will be conveyed to the receiver 20'' and thence through the air in the parts 19, 18, 2, 9 and 8 to the diaphragm 7, the vibrations of which will be recorded upon the surface 12 by the stylus 10. It is to be noted that the switch member 28 is electrically connected to only one of the conductors 38 and 42 at any given time so that when the recording stylus 10 is in operative position, not only is the reproducing stylus out of operative position but the current from the battery 26 is cut off from the transmitter 23 and the receiver 37. Likewise, when the reproducing stylus is in engagement with the record, the recording stylus is out of engagement with the record and the current from the battery is shut off from the transmitter 41 and the receiver 20''. For this reason, interference of the recording instruments with the reproducing instruments or vice versa is effectively prevented and there is a material saving of current from the battery 26.

In the modification shown in Fig. 2 an amplifying sound conveyer or horn 43 takes the place of the transmitter 23, the receiver 37 and the circuit connections between the same shown in Fig. 1, and the receiver 20' is mounted directly in the upper end of the hollow tubular neck or passage 18' extending upwardly from the sound box body 2. The opening 44 between the horn 43 and the neck 18' is arranged to be closed by a spherical valve member 45 when the recorder is in operative position so as to shut the horn 43 off from the passage 18'. As shown in Fig. 2, the reproducing stylus is in operative position and the valve member 45 has rolled downwardly along the horn 43 away from the opening 44 and into engagement with the limiting pin 46 which extends across the said horn. When the member 14 is operated to move the recording stylus into engagement with the record surface, the left hand end of the horn 43, referring to Fig. 2, is tilted upwardly to cause the member 45 to roll along the horn until it covers and closes the opening 44. The member 45 should be of sufficiently large diameter not to pass through the opening 44. One of the terminals of the battery 26' is connected to one of the binding posts 32' of the receiver 20' by a conductor 29'. The other terminal of the battery is connected, by the conductor 40' to the transmitter 41' which latter is likewise connected to the conductor 42' which extends adjacent to the under side



of the switch member 28'. The switch member 28' is connected by the conductor 27' to the binding post 39' of the receiver 20'. With the parts in the position shown in Fig. 2, the reproducing stylus is in engagement with the record surface and the free passage of the reproduced sound waves through the opening 44 and the horn 43 is permitted, the recording apparatus being inoperative by reason of the fact that the switch member 28' is disconnected from the conductor 42' and the recording stylus is out of engagement with the record surface. When the member 14 is moved to the left, the recording stylus is moved into engagement with the record and the reproducing stylus moved out of engagement with the same, the switch member 28' being moved downwardly into electrical connection with the conductor 42', thereby closing the circuit from the battery 26' through the conductor 40', transmitter 41', conductor 42', switch member 28', conductor 27', receiver 20', and conductor 29' and back to the battery 26'. At the same time, the valve member 45 rolls to the right, referring to Fig. 2, down the horn 43 and closes the opening 44 so as to shut the horn off from the rest of the apparatus. Undulations corresponding to the sound waves impressed upon the transmitter 41' are now conveyed to the receiver 20', impressed upon the diaphragm 7, and recorded in the surface 12 by the stylus 10. The operation of the member 14 to the right will again move the parts into the position shown in Fig. 2.

The two forms of my invention shown in the drawing are merely illustrative of my invention and are not to be considered as limiting the latter in any manner, as many modifications may be made without departing from the spirit of my invention.

Having now described my invention, what I claim as new and desire to protect by Letters Patent of the United States is as follows:

1. The combination of vibratory means, a recording stylus and a reproducing stylus in operative relation to said means, means for impressing vibrations corresponding to sound waves upon said vibratory means, means for conveying vibrations from said vibratory means, and unitary means for rendering said vibration impressing means operative or inoperative and for causing said recording stylus to be moved respectively into or out of operative position, substantially as described.

2. The combination of vibratory means, a recording stylus and a reproducing stylus in operative relation to said means, means for impressing vibrations corresponding to sound waves upon said vibratory means, means for conveying vibrations from said vibratory means, and unitary means for

rendering said vibration conveying means operative or inoperative and for causing said reproducing stylus to be moved respectively into or out of operative position, substantially as described.

3. The combination of vibratory means, a recording stylus and a reproducing stylus in operative relation to said means, means for impressing vibrations corresponding to sound waves upon said vibratory means, means for conveying vibrations from said vibratory means, and unitary means for rendering said vibration impressing means operative and said vibration conveying means inoperative and for causing said recording stylus to be moved into operative and said reproducing stylus into inoperative position, or for rendering said vibration impressing means inoperative and said vibration conveying means operative and for causing said recording stylus to be moved into inoperative position and said reproducing stylus into operative position, substantially as described.

4. The combination of vibratory means, a recording stylus and a reproducing stylus in operative relation to said means, electrically operable means for impressing vibrations corresponding to sound waves upon said vibratory means, means for conveying vibrations from said vibratory means, and unitary means for rendering said vibration impressing means operative and said vibration conveying means inoperative and for moving said recording stylus into and said reproducing stylus out of operative position, substantially as described.

5. The combination of vibratory means, a recording stylus and a reproducing stylus in operative relation to said means, means for impressing vibrations corresponding to sound waves upon said vibratory means, electrically operable means for conveying vibrations from said vibratory means, and unitary means for rendering said vibration impressing means inoperative and said vibration conveying means operative and for moving said recording stylus out of and said reproducing stylus into operative position, substantially as described.

6. The combination of vibratory means, a recording stylus and a reproducing stylus in operative relation to said means, electrically operable means for impressing vibrations corresponding to sound waves upon said vibratory means, electrically operable means for conveying vibrations from said vibratory means, and unitary means for rendering said vibration impressing means operative and said vibration conveying means inoperative and for moving said recording stylus into and said reproducing stylus out of operative position, or for rendering said vibration impressing means inoperative and said vibration conveying means

operative and for moving said recording stylus out of and said reproducing stylus into operative position, substantially as described.

7. The combination of a diaphragm, a re-  
5 cording stylus and a reproducing stylus in  
operative relation thereto, means for im-  
pressing vibrations corresponding to sound  
waves upon said diaphragm, means for con-  
veying vibrations from said diaphragm, and  
10 unitary means for rendering said vibration  
impressing means operative and said vibra-  
tion conveying means inoperative and for  
causing said styli to be moved about a sub-  
stantially horizontal axis to place said re-  
15 cording stylus in operative position and said

reproducing stylus in inoperative position,  
or for rendering said vibration impressing  
means inoperative and said vibration convey-  
ing means operative and for causing said 20  
styli to be moved about said axis to place said  
recording stylus in inoperative position and  
said reproducing stylus in operative position,  
substantially as described.

This specification signed and witnessed  
this 14th day of September, 1914.

NEWMAN H. HOLLAND.

Witnesses:

FREDERICK BACHMANN,  
MARY J. LAIDLAW.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."

PHONOGRAPH,  
#1,229,775-----Frank S. Moore,  
Patented-June 12th, 1917.  
Filed-March 29th, 1916.



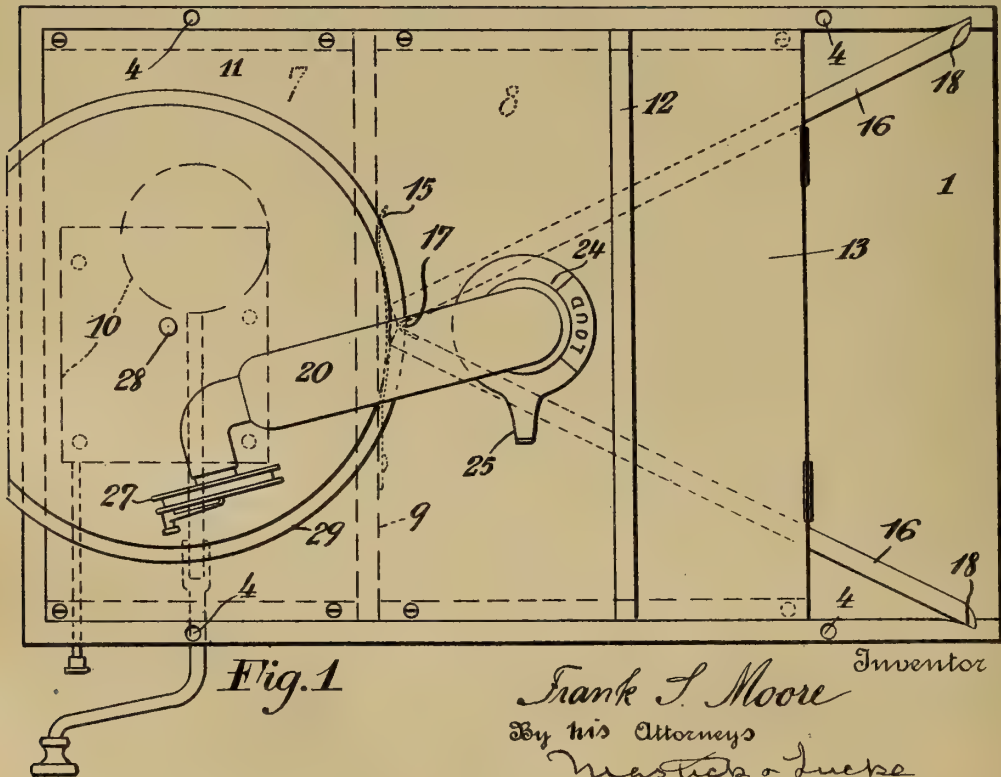
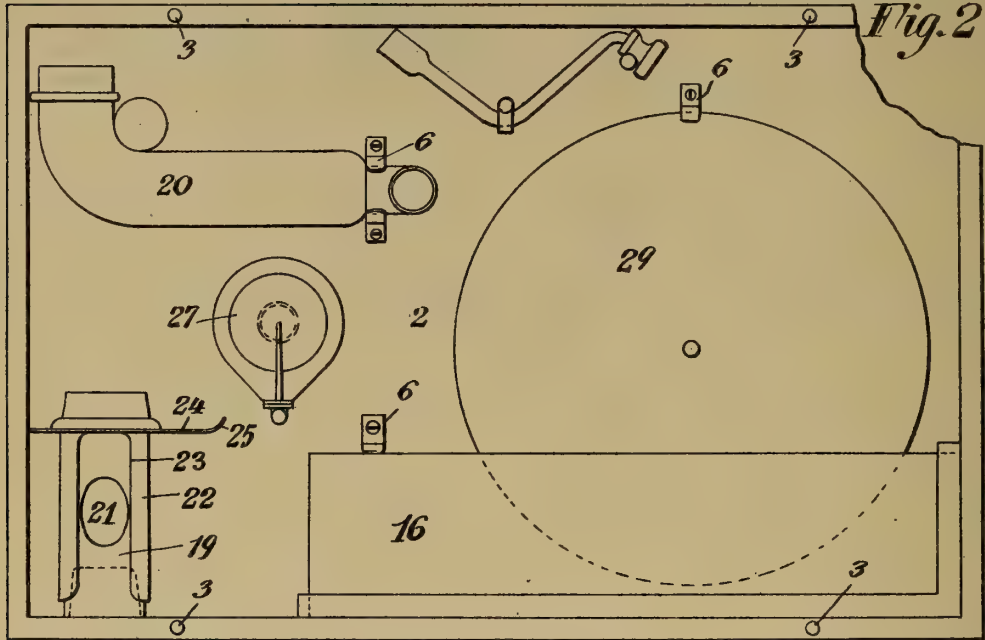
F. S. MOORE.  
PHONOGRAPH.

APPLICATION FILED MAR. 29, 1916.

Patented June 12, 1917.

2 SHEETS—SHEET 1.

1,229,775.

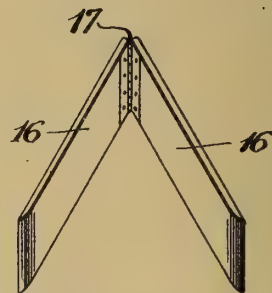
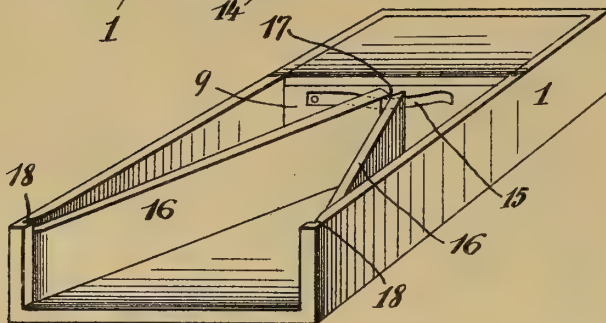
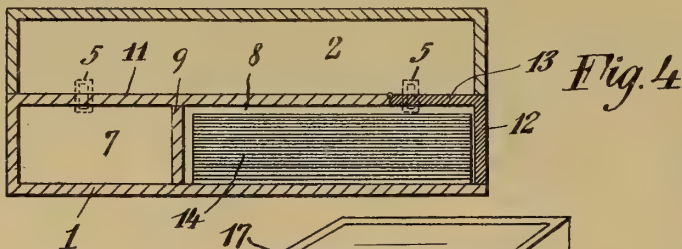


Frank S. Moore  
By his Attorneys  
Masters & Luke

Inventor



1,229,775.



Frank S. Moore Inventor

By his Attorneys  
Mastick & Lucke



# UNITED STATES PATENT OFFICE.

FRANK S. MOORE, OF BROOKLYN, NEW YORK.

PHONOGRAPH.

1,229,775.

Specification of Letters Patent. Patented June 12, 1917.

Application filed March 29, 1916. Serial No. 87,397.

*To all whom it may concern:*

Be it known that I, FRANK S. MOORE, a citizen of the United States of America, residing in the borough of Brooklyn, city and State of New York, have invented a certain new and useful Improvement in Phonographs, of which the following is a specification.

My invention relates to an improvement in phonographs and is particularly directed toward the sound amplifying and controlling means, although other features of invention will become apparent as the description develops.

In the following I have described, in connection with the accompanying drawings, an embodiment of one way of carrying out my invention, the features thereof being pointed out hereinafter in the claims.

In the drawings, Figure 1 is a top plan view of the lower casing or body portion of a phonograph illustrating my invention, part being broken away;

Fig. 2 is a plan view from the inside of the top of the casing showing certain parts detached from the body portion and housed in said top for transportation;

Fig. 3 is a side view partly in section and partly broken away, of the parts as shown in Fig. 1, the top being shown beneath to act as a sound box;

Fig. 4 is a sectional view of the casing assembled, with the phonograph parts removed to show the construction of the casing and showing also a means for storing records;

Fig. 5 is a perspective view of the body portion, parts being removed, to show more clearly the arrangement of sound amplifying and directing means;

Fig. 6 is a perspective of the detachable sound director.

The device as illustrated is designed to be readily portable although the principles of the invention may as well be applied to those relatively more stationary.

In the drawings similar numerals of reference indicate similar parts.

1 indicates the lower casing or body portion of the phonograph and 2 the top or cover therefor, the two portions being adapted to be fitted upon each other over dowel pins 3 and corresponding recesses 4 and fas-

tened together by any suitable means as by catches 5, 5. The body portion 1 may also be provided with recesses (not shown) in the bottom corresponding to recesses 4 so that when the top 2 has been emptied of the removable parts it may be placed beneath body portion 1 and used as a base therefor. In this position it also fulfils the function of an amplifier.

The top 2 is preferably of sufficient depth to accommodate the removable parts as shown, the same being held against displacement therein by any suitable means as by spring clamps 6, 6, or if the removable parts are accommodated elsewhere, the top could be used for the storage of records.

The body portion 1 is preferably divided into two portions 7 and 8 by a transverse partition 9, the portion 7 being adapted to accommodate the motor mechanism 10 and the portion 8 being adapted to act as a sound reception box. 11 indicates a cover inclosing the body portion 1. One end of the body portion, as 12, is fastened to a portion of the cover 11, as 13, which in turn is hinged to the cover 11, so that when the same is swung upward, the sound reception box will be opened and the records 14, stored for safe keeping or for transportation in portion 8, may be removed. If the records should be stored in the top, portion 8 may be used for storage of the removable parts.

15 is a resilient device such as a leaf spring positioned on partition 9, or elsewhere in the sound reception box in the path of arms or flaps, 16, 16 hinged together at 17 and adapted when in position in portion 8 to contact at the apex or hinged end with device or spring 15 and to have their other ends held in recesses or grooves 18 in the walls of casing 1 against which recesses they are urged by spring 15. The exact form of said part 16, 16 is not essential, the material feature of such detail being to form side walls for the sound box converging from without inwardly. In some instances part 16, 16 may be entirely omitted.

19 indicates an extension of the tone arm 20, provided with an opening 21 in the wall thereof. Such extension may be either integral or separate from the tone arm but I have shown it as separate for convenience



of packing after demounting. 22 is a sleeve or clip around or partially around extension 19 and provided preferably with an opening 23 adapted to register with opening 21 in extension 19. Both extension 19 and sleeve 22 may be freely rotatable on their vertical axes, so that the sound through openings 21 and 23 may be directed to different parts of the sound reception box and, as extension 19 and sleeve 22 are also rotatable relatively to each other, the opening for the sound may be adjusted as desired. I prefer however to have extension 19 fixed in position. Sleeve 22 extends through cover 11 and is shown as provided with a flange 24 having a thumb piece 25 to assist in moving the same. Extension piece 19 also extends up through cover 11 within sleeve 22 and as shown, is adapted to receive tone-arm 20. Both extension 19 and sleeve 22 are removable from the body portion 1. Suitable indicating means, as shown, may be associated with the sleeve 22 to indicate the relative positions of the openings through the extension piece and the sleeve; for instance, when the openings 21 and 23 register the volume of sound from the tone-arm will be the loudest.

27 indicates the reproducer and 28 the record support mounted on spindle 29 of the motor mechanism in any convenient way.

The operation of the device as illustrated is as follows: Assuming the removable parts to be housed in top 2, the records to be stored in portion 8 and the body portion 1 and top 2 to be fastened together like a small flat suit case; the catches 5, 5 will be released, top 2 removed from body portion 1 and laid to one side. End 12 will be lifted and turned back on cover 11 and the records 14 removed from portion 8. The removable parts will now be removed from top 2 and arms 16, 16 will be inserted into portion 8, hinged end 17 first, until end 17 contacts spring 15, when the arms 16, 16 having been spread out into contact with the side walls of portion 8, the free ends of the arms will snap into recesses or grooves 18. Sleeve 22 is next placed in position and extension 19 passed through sleeve 22. The tone-arm, reproducer and other parts are placed in position in the usual manner. The motor being ready to operate, a record is placed in position and extension 19 and sleeve 22 adjusted relative to the size of opening there-through and relative to the direction of the sound in the V-shaped amplifying chamber formed by the bottom and cover of body portion 1 and the spread out arms 16, 16. The apparatus is then ready for use. I prefer that the tone arm extension fit closely into the crotch of the V-shaped walls with the opening 21 directed outward.

In demounting the reverse of the operation described takes place. It is preferred to make the case and the arms 16, 16 of wood. The emptied top 2 as described may be used as a base and sound box for body portion 1. A handle (not shown) may be fastened to the case to assist in carrying the same.

It is obvious that certain of the parts may be varied in construction and arrangement without departing from the spirit of the invention and I do not restrict myself further than the scope of the appended claims demands.

I claim:

1. In a phonograph, a body portion having top and bottom walls, a sound amplifying chamber wholly within said body portion and comprising said top and bottom walls of the body portion and collapsible side walls, a tone-arm and an extension from said tone-arm projecting into said sound amplifying chamber within said side walls.
2. In a phonograph, a body portion having top and bottom walls, a sound amplifying chamber wholly within said body portion and comprising said top and bottom walls of the body portion and removable, collapsible side walls, a tone-arm and a removable extension from said tone-arm projecting into said sound amplifying chamber within said side walls.
3. In a phonograph, a sound amplifying chamber wholly within the body portion of the phonograph, collapsible side walls therefor, a tone-arm and an extension from said tone-arm projecting into said sound amplifying chamber adjacent said side walls.
4. In a phonograph, a sound amplifying chamber wholly within the body portion of the phonograph, removable, collapsible side walls therefor, a tone-arm and an extension from said tone-arm projecting into said sound amplifying chamber adjacent said side walls.
5. In a phonograph, a casing, a sound amplifying chamber within the casing, a tone-arm extension having an opening in its side wall, loosely mounted in the casing and projecting into the sound amplifying chamber, a sleeve for said tone-arm extension having an opening in its side wall and rotatable relative to said tone-arm extension and a tone-arm mounted on said tone-arm extension.
6. In a phonograph, a sound amplifying chamber wholly within the body portion of the phonograph having permanent top and bottom walls and removable side walls comprising collapsible members.
7. In a phonograph, a sound amplifying chamber wholly within the body portion of the phonograph having permanent top and bottom walls and V-shaped side walls com-

prising members hinged together at one end and adapted to be spread apart at the other end.

8. In a phonograph, a chamber having  
5 permanent top, bottom and side walls and a sound amplifying chamber formed within said top and bottom walls and V-shaped removable side walls, said latter walls com-

prising collapsible members hinged together at one end and at the free ends adapted to 10 contact the said walls of the first mentioned chamber.

In testimony whereof I have signed this specification.

FRANK S. MOORE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





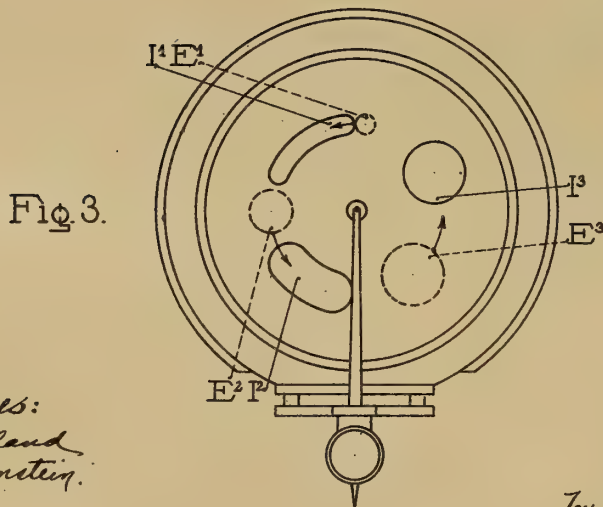
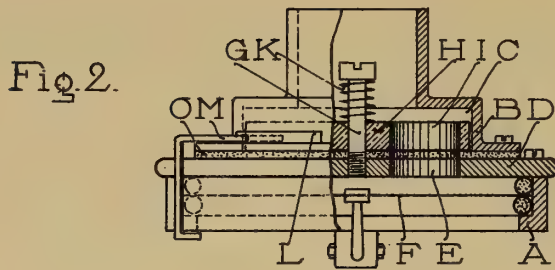
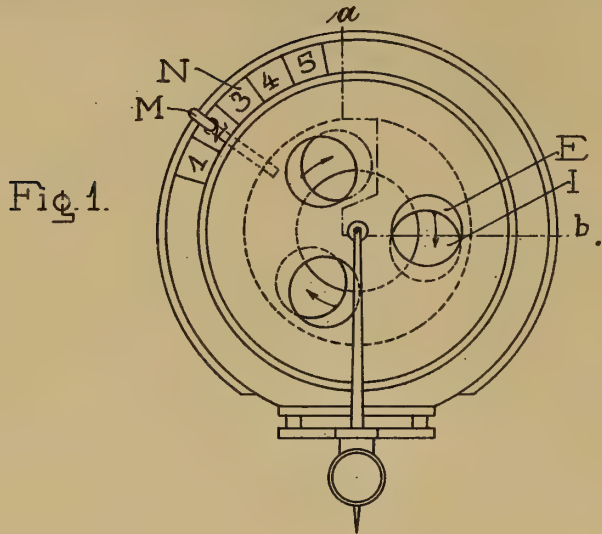
SOUND-BOX FOR TALKING-  
MACHINES,

#1,229,780-----Walter Opel ~~Leipzig~~,  
Patented-June 12th, 1917.  
Filed-March 5th, 1915.

W. OPEL.  
SOUND BOX FOR TALKING MACHINES.  
APPLICATION FILED MAR., 5, 1915.

1,229,780.

Patented June 12, 1917.



Witnesses:  
Jas. E. Holand  
Ray R. Greenstein.

Inventor:  
Walter Opel  
by L. K. Böhm,  
Attorney.



# UNITED STATES PATENT OFFICE.

WALTER OPEL, OF LEIPZIG, GERMANY.

SOUND-BOX FOR TALKING-MACHINES.

1,229,780.

Specification of Letters Patent.

Patented June 12, 1917.

Application filed March 5, 1915. Serial No. 12,237.

*To all whom it may concern:*

Be it known that I, WALTER OPEL, a citizen of Germany, and a resident of Leipzig, Saxony, State of Germany, have invented  
5 certain new and useful Improvements in or relating to Sound-Boxes for Talking-Machines, of which the following is a specification.

In order to increase or to weaken the tone  
10 action in talking machines use is made in connection with the sound-box of needles of appropriately greater or smaller thickness. It is, therefore, necessary to interrupt the playing when an alteration in the tone is to  
15 be obtained. Moreover, the exchange of the needles is not only costly but frequently results in inconveniences. Experiments have been made with a view to changing the tone  
20 action by enlarging or increasing the passage, in the sound tube by means of a closing member. The known devices of this kind, however, have the drawback that the individual oscillations of the closing member result in disturbing noises while at the same  
25 time the adjustment is so complicated and difficult that it cannot be effected during playing.

The object of this invention is to avoid the above defects by controlling the clear passage of the sound-box casing with the aid of  
30 two superposed disks having perforations which are adapted to register with each other. This is accomplished by making one disk rotatable, that is to say, this disk is  
35 capable of oscillating about an axis so that its perforation more or less frees that of the other disk as will be more clearly understood from a description of the accompanying drawings, in which:

40 Figure 1 is a front view of the improved sound-box,

Fig. 2 is a partial elevation and vertical section thereof, on the line *a-b* of Fig. 1, and

45 Fig. 3 is a front view of a modified construction.

In the example shown, the casing A of the sound-box has connected to it a socket B which is provided with a box-shaped enlargement C, as best shown in Fig. 2. This enlargement serves as the sound chamber proper of the sound-box. The sound-box  
50 itself is closed by a disk D which serves also as a carrier of the socket B. The disk D is

provided with perforations E through which  
55 the sounds produced by the diaphragm F pass into the chamber C and by way of the socket B are transmitted to the tone-arm attached thereto, but not shown in the drawing.

Rotatably journaled above the disk D  
60 about an axis G is a second disk H provided with perforations I. The perforations in the disk H and those in the disk D are so located with regard to one another as to enable  
65 the clear passage to be regulated by the rotation of the disk H.

The disk H is journaled about a relatively light axis or bolt G. This disk H is easily  
70 rotatable on the adjoining face of the disk D. The disk H consists, by preference, of vulcanized fiber, felt or other material which is not liable to individual vibrations causing disturbing noises. In order to prevent oscillations of the disk H from being  
75 transmitted to the disk D, provision may be made also between the two disks of a layer O of felt or like material. The contact, however, between the two disks may be insured by a weak spring K which is slipped  
80 over the axis G.

In this manner, while safeguarding a reliable bearing of the rotary disk H on the stationary disk D, an easy rotation of the  
85 disk H and thereby a ready variation of the free passage for the sound is at all times assured. By introducing through a slot L in the casing C a bent pin M into the disk H so as to serve as a pointer or indicator, the extent of the adjustment of the disk H with  
90 regard to the disk D may readily be read off from a dial N on the sound-box. It is, therefore, possible to vary the strength of the tone in talking machines of this kind by merely adjusting the pointer N on the dial  
95 and this may be effected even during the playing.

In the constructional example shown in  
Fig. 3, one of the disks is provided with  
100 three perforations E<sup>1</sup>, E<sup>2</sup>, E<sup>3</sup>, of gradually increasing diameter, thereby enabling the strength of the tone to be regulated from the finest pianissimo to the strongest fortissimo. To this end the second disk is provided with  
105 three perforations I<sup>1</sup>, I<sup>2</sup>, I<sup>3</sup>, of which the two former perforations are in the shape of oblong slots in order to remain open during the whole passage.

In the constructional forms illustrated the axis G has a central arrangement, but it is obvious that it may have an eccentric arrangement, particularly in the case in which the disk H is to perform merely an oscillating movement on the disk D.

I claim as my invention:

1. A sound box for talking machines in which the regulation of the tone is effected by superposed perforated disks, comprising the sound box casing with perforated rear wall, a box shaped enlargement provided on the rear wall of the sound box casing and adapted to house a perforated disk, a central

shaft for said disk within the box and enlargement, and a spring on said shaft adapted to press the perforated disk against the perforated rear wall of the sound box.

2. A sound box for talking machines, comprising the sound box casing with perforated rear wall, a box shaped enlargement provided on the rear wall of the sound box casing, a central shaft within said casing and enlargement, and means on said central shaft for regulating the tone.

Signed at Leipzig, Germany this 11<sup>th</sup> day of February 1915.

WALTER OPEL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

SOUND TRANSMITTING  
APPARATUS,

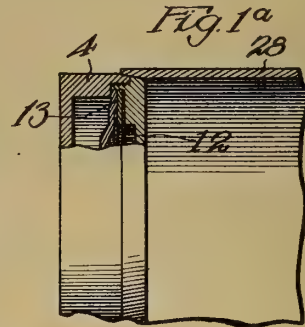
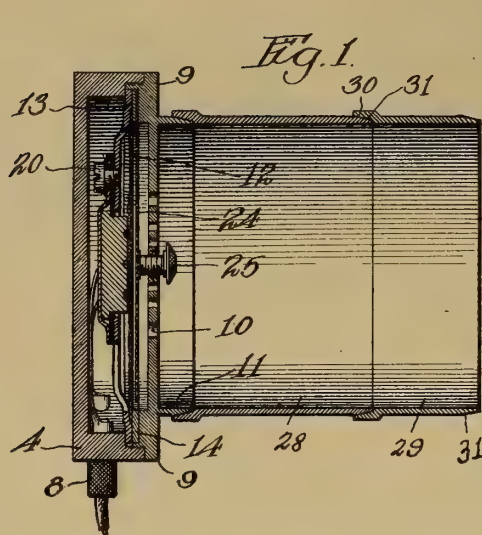
#1,230,230-----A. E. Coy,  
Patented-June 19th, 1917.  
Filed-September 14th, 1914.



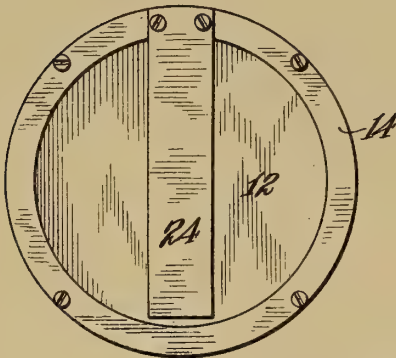
A. E. COY.  
SOUND TRANSMITTING APPARATUS.  
APPLICATION FILED SEPT. 14, 1914.

1,230,280.

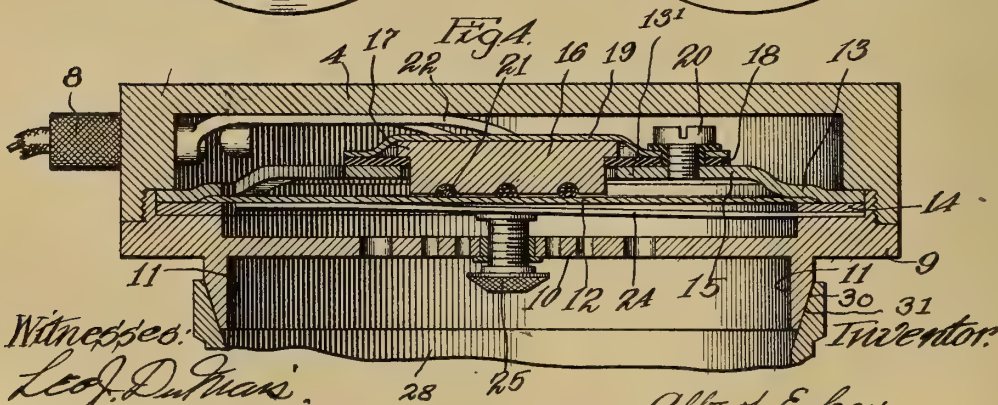
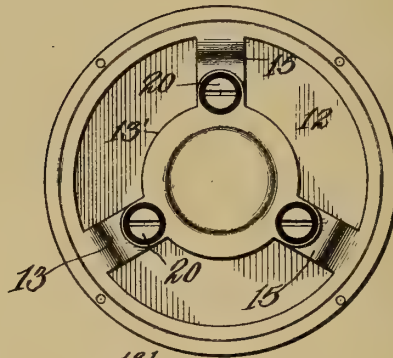
Patented June 19, 1917.  
2 SHEETS—SHEET 1.



*Fig. 2.*



*Fig. 3.*



Witnessed:

Leo J. Dumas.

Arthur B. Franke.

Albert E. Coy.

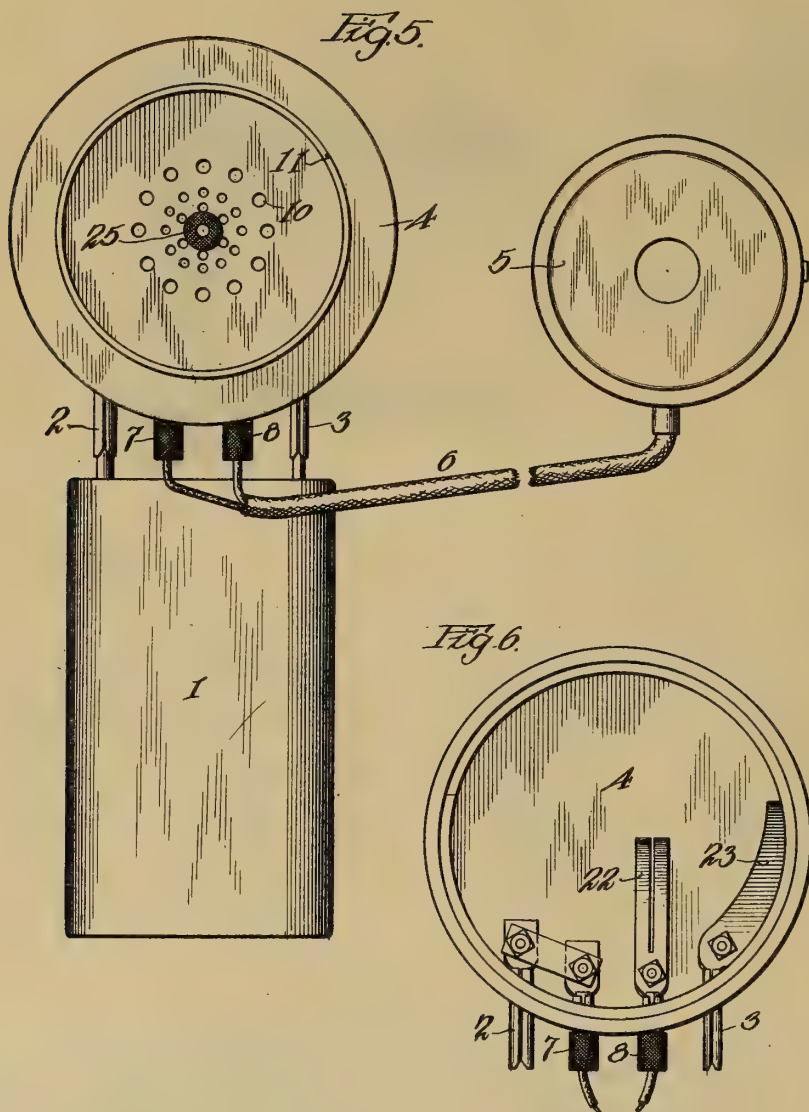
by Robert Burne Atty.



A. E. COY.  
SOUND TRANSMITTING APPARATUS.  
APPLICATION FILED SEPT. 14, 1914.

1,230,280.

Patented June 19, 1917.  
2 SHEETS—SHEET 2.



Witnesses:  
Leo J. DuMars,  
Arthur B. Franke

Inventor:  
Albert E. Coy,  
by Robert Burns Atty.



# UNITED STATES PATENT OFFICE.

ALBERT E. COY, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE MAGNIPHONE COMPANY, A CORPORATION OF ARIZONA.

## SOUND-TRANSMITTING APPARATUS.

1,230,280.

Specification of Letters Patent. Patented June 19, 1917.

Application filed September 14, 1914. Serial No. 861,553.

*To all whom it may concern:*

Be it known that I, ALBERT E. COY, a citizen of the United States of America, and a resident of Chicago, in the county of Cook, State of Illinois, have invented certain new and useful Improvements in Sound-Transmitting Apparatus, of which the following is a specification.

This invention relates to that class of telephone apparatus in which means is provided for regulating the intensity and amplitude of the vibrations of the diaphragm of the transmitter, and for properly directing the sound waves to such diaphragm with an elimination of foreign sounds in the vicinity of the instrument. And the present improvement has for its object to provide an effective structural formation and association of parts whereby the degree or amplitude of the vibrations of the transmitter diaphragm can be readily adjusted to attain the desired intensity, purity, and distinctness in the sound transmitted, with an elimination or avoidance of loud, harsh, or grating tones in one case, and in the other case attain a distinct and effective transmission of soft and low sounds.

In the accompanying drawings:—

Figure 1 is a longitudinal section of a telephone transmitter embodying the present improvements.

Fig. 1<sup>a</sup> is a detail sectional elevation of a modification.

Fig. 2 is a detail elevation of the front portion of the diaphragm and its attached accessories.

Fig. 3 is a similar view of the rear portion of the aforesaid diaphragm and attached accessories.

Fig. 4 is an enlarged detail longitudinal section of the transmitter.

Fig. 5 is a general elevation illustrating the association of the present invention with a local battery and receiver, and adapted for use of persons of defective hearing.

Fig. 6 is an elevation of the interior of the transmitter casing, the diaphragm and its attached accessories being removed.

Similar reference numerals indicate like parts in the several views.

Referring to the drawings, 1 represents the local battery adapted for connections with suitable terminal sockets 2 and 3 of the transmitter casing 4; while 5 designates

an ordinary receiver having flexible line connections 6 with terminal necks 7 and 8 of the transmitter casing 4 aforesaid. The parts so associated being adapted for the use of persons with defective hearing.

The transmitter casing 4 above referred to is of the usual shallow cup shape shown, and provided with the usual closure disk or cover 9, the marginal portion of which is formed with a screw-threaded rim which screws into a screw-threaded offset of the circular wall of the casing 4, to confine in proper position the diaphragm and its attached accessories, as usual in the present class of telephone transmitters. The aforesaid closure disk or cover 9 is formed with the usual centrally disposed cluster of small apertures 10 for the passage of the sound waves to the transmitter diaphragm and in the present improvement is provided with an annular outstanding rim 11, the periphery of which is made tapering for the purpose hereinafter stated.

12 designates the transmitter diaphragm of any ordinary form or construction, preferably of the flat disk form shown.

13 designates a cup shaped skeleton head formed with an annular receiving recess for the marginal portion of the diaphragm 12 which is held in place in said recess by a marginal confining ring 14 and suitable binding screws as shown. Said skeleton head 13 in addition to the marginal portion above mentioned has a central portion 13' orificed for the passage of the microphone member hereinafter described, with said central portion integrally connected to the marginal portion by a plurality of radial arms 15 as illustrated in Figs. 1, 3, and 4.

16 designates a microphone block of carbon or like conducting material, and preferably formed with a peripheral supporting flange 17 at one end as shown. Said microphone block 16 projects through the central orifice of the aforesaid central portion 13' of the skeleton head 13, without electrical contact therewith, and is supported in place thereon and in insulated relation thereto, by an interposed washer 18 of insulating material, a binding cap 19 of metal, and insulating binding screws 20, as shown more particularly in Fig. 4.

The front end of microphone block 16 is in separated relation to the adjacent face of



the transmitter diaphragm 12 aforesaid, and said front face of the block is formed with a plurality of cells or recesses 21 for the reception of granules of carbon by which microphone properties are imparted to the structure, and as usual to the present type of transmitters.

22 designates a contact finger attached to the transmitter casing 4, with its free end bearing against the binding cap 19, aforesaid, and adapted to electrically connect the microphone block 16 with a terminal sleeve 8 of the transmitter casing 4.

23 designates a companion contact finger attached to the transmitter casing 4, with its free end bearing on the marginal portion of the skeleton head 13 and adapted to electrically connect the diaphragm 12 with a terminal socket 3 of the transmitter casing 4.

The material part of this invention involves in connection with the diaphragm of the transmitter mechanism above described, a resilient damper member having bearing contact upon the face of the diaphragm and adjustable thereon in the area of said contact and with said area increasing from a point of slight vibration of the diaphragm toward a point of greater vibration thereof, and in the preferred type of the invention illustrated in Figs. 1, 2, and 4, the adjustability and varied resiliency in the damper member are simultaneously attained by a structural formation and association of parts, as follows:

24 designates a damper member or finger of resilient plate material attached at one end in fixed relation to a marginal portion or frame of the transmitter diaphragm 12 and extending diametrically across said diaphragm as indicated in Fig. 2.

25 designates a headed adjustable screw having screw threaded bearing in the central portion of the closure disk or cover 9 of the transmitter casing 4, so as to be capable of manual adjustment in a lengthwise direction. At its inner end, the adjustable screw 25 has abutment against the resilient damper finger 24, midway the length of the same, and is adapted in its adjustment to bring more or less of the free end portion of said damper finger 24 into contact with the diaphragm 12, and with correspondingly more or less pressure at the point of the contact. Such action is adapted to afford a very effective and controllable regulation of the vibration of the diaphragm 12 in actual use.

In connection with the sound transmitting apparatus above described, it is preferable to use a sectional and variable sound collecting structure having a formation as follows:—

28 and 29 are a plurality of open ended cylindrical shells of varying lengths and

having uniform internal diameters corresponding with the internal diameter of the annular outstanding rim 11 of the closure disk or cover 9 of the transmitter casing heretofore described. In the present improvement the bore of the rim 11 will have a cylindrical form corresponding with that of the above mentioned shells 28 and 29, and the series of the parts are interchangeably connected together by forming the aforesaid rim 11 and an end portion of each shell 28, 29 with tapering exteriors 30, and in connection with such formation, forming the opposite end portions of each shell 28, 29 with correspondingly tapering or flaring interiors 31, as shown. With the above described construction the outstanding neck 11 can be used alone as a sound wave conductor where a wide range of the sound waves are to be collected. With more restricted ranges of the sound waves to be collected, either one or the other of the shells 28, 29 will be used in connection with the outstanding neck 11. And where a still less range of sound waves are to be collected, both of said shells 28, 29 will be used in connection with the outstanding neck 11, aforesaid.

Having thus described my said invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a sound transmitter of the type described, the combination of a diaphragm, damping means adapted for contact with said diaphragm and adjustable in the area of said contact with the area increasing from a point of slight vibration of the diaphragm toward a point of greater vibration thereof, substantially as set forth.

2. In a sound transmitter of the type described, the combination of a diaphragm, damping means adapted for contact with said diaphragm and adjustable from the outer edge of said diaphragm toward the center as pressure on the diaphragm is increased, substantially as set forth.

3. In a sound transmitter of the type herein described, the combination of a diaphragm, adjustable damping means adapted for contact with said diaphragm, a transmitter casing formed with an annular outstanding neck, a thumb piece located within said annular neck for manually operating said adjustable damping means, substantially as set forth.

4. In a sound transmitter of the type described, the combination of a diaphragm, a resilient damper finger attached adjacent to the margin of said diaphragm with its free end adapted for contact with the diaphragm, and means for changing the location and pressure of said free end of the damper finger upon the diaphragm, substantially as set forth.

5. In a sound transmitter of the type de-

scribed, the combination of a diaphragm, a  
resilient damper finger attached adjacent  
to the margin of said diaphragm with its  
free end adapted for contact with the dia-  
5 phragm, and means for regulating the loca-  
tion of and pressure on the point of contact  
of said free end of the damper finger upon  
the diaphragm, the same comprising a  
temper screw having bearing in the casing

of the transmitter and abutting against the 10  
damper finger, substantially as set forth.

Signed at Chicago, Illinois, this 11th day  
of September, 1914.

ALBERT E. COY.

Witnesses:

K. A. MARTENSEN,

A. KEHOE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."



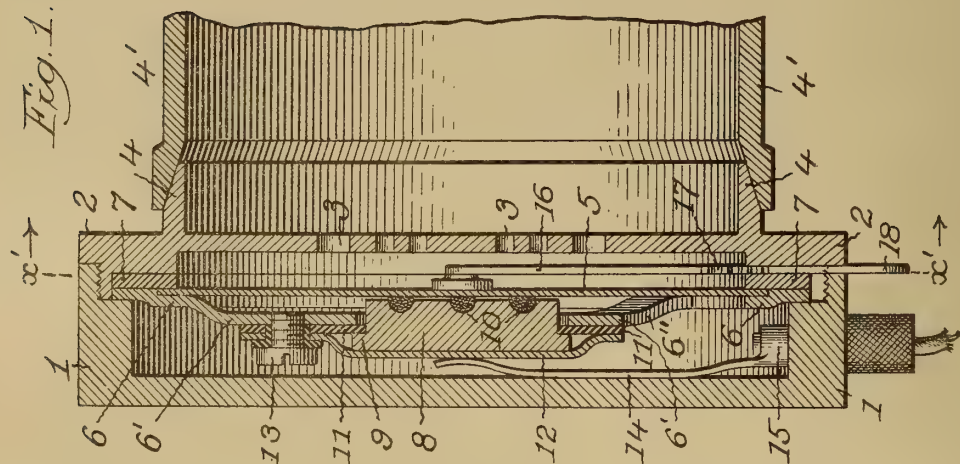
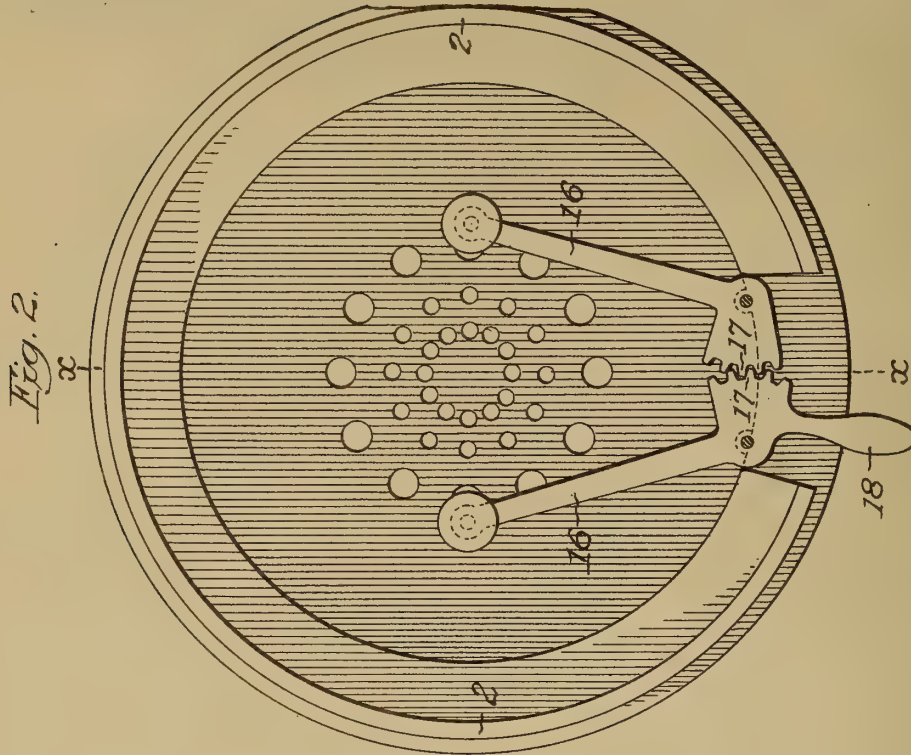
The first part of the book is devoted to a general survey of the subject. It begins with a definition of the term "philosophy" and a discussion of its history. The author then proceeds to a discussion of the various branches of philosophy, including metaphysics, epistemology, ethics, and politics. The second part of the book is devoted to a more detailed examination of the various branches of philosophy. It begins with a discussion of metaphysics, which is the study of the nature of reality. The author then discusses epistemology, which is the study of knowledge. This is followed by a discussion of ethics, which is the study of morality, and finally a discussion of politics, which is the study of government and society. The third part of the book is devoted to a discussion of the various philosophical schools of thought. It begins with a discussion of the ancient Greek philosophers, including Plato and Aristotle. This is followed by a discussion of the medieval philosophers, including Thomas Aquinas. The third part of the book concludes with a discussion of the modern philosophers, including Immanuel Kant and Friedrich Hegel. The fourth part of the book is devoted to a discussion of the various philosophical movements of the twentieth century. It begins with a discussion of the phenomenologists, including Edmund Husserl. This is followed by a discussion of the existentialists, including Søren Kierkegaard and Jean-Paul Sartre. The fourth part of the book concludes with a discussion of the postmodernists, including Jacques Derrida and Michel Foucault. The fifth part of the book is devoted to a discussion of the various philosophical problems of the twenty-first century. It begins with a discussion of the problem of consciousness, which is the study of the nature of the mind. This is followed by a discussion of the problem of free will, which is the study of whether or not we have control over our actions. The fifth part of the book concludes with a discussion of the problem of the meaning of life, which is the study of what makes life worth living. The book concludes with a discussion of the various philosophical traditions of the world, including the Chinese, Indian, and Islamic traditions. The author then discusses the relationship between philosophy and other disciplines, such as science, art, and religion. Finally, the author discusses the role of philosophy in society and the importance of philosophical education. The book is written in a clear and concise style, making it accessible to a wide range of readers. It is a valuable resource for anyone interested in philosophy and its various branches.

SOUND TRANSMITTING APPARATUS,  
#1,230,281,-----A.E.Coy,  
Patented-June 19th, 1917.  
Filed-July 8th, 1916.

A. E. COY.  
SOUND TRANSMITTING APPARATUS.  
APPLICATION FILED JULY 8, 1916.

1,230,281.

Patented June 19, 1917.



Witness:  
John Enders

Inventor:  
Albert E. Coy,  
by Robert Burns,  
Attorney



# UNITED STATES PATENT OFFICE.

ALBERT E. COY, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE MAGNIPHONE COMPANY, A CORPORATION OF ARIZONA.

## SOUND-TRANSMITTING APPARATUS.

1,230,281.

Specification of Letters Patent.

Patented June 19, 1917.

Original application filed September 14, 1914, Serial No. 861,553. Divided and this application filed July 8, 1916. Serial No. 108,164.

### *To all whom it may concern:*

Be it known that I, ALBERT E. COY, a citizen of the United States of America, and a resident of Chicago, in the county of Cook, State of Illinois, have invented certain new and useful Improvements in Sound-Transmitting Apparatus, of which the following is a specification.

This invention relates to electrical sound transmitting apparatus, and is a division of my prior application for a patent Serial No. 861,553, filed September 14, 1914.

The object of the present improvement is to provide a structural formation and association of parts adapted to attain in a ready and accurate manner the desired degree or amplitude of the vibrations of the diaphragm of a sound transmitting apparatus, and with which increased purity and distinctness in the sound transmitted is effectively attained, with an avoidance of harsh or grating tones in one case, and the attainment of a distinct transmission of soft and low tones in the other case, all as will hereinafter more fully appear.

In the accompanying drawings:—

Figure 1 is an enlarged longitudinal section on line  $x-x$ , Fig. 1.

Fig. 2, is a sectional elevation on line  $x'x'$ , Fig. 2. Similar reference numerals indicate like parts in both views.

Referring to the drawings, 1 designates the transmitter shell or casing, preferably of the shallow cup form shown, and provided with the usual closure cap or cover 2, the marginal portion of which is provided with a screw-threaded formation adapted for engagement with a correspondingly formed portion of the shell 1.

3 designates a centrally disposed cluster of small apertures formed in the cap 2, for the passage of the sound waves to the transmitter diaphragm of the structure.

4 designates an annular rim or neck on the cap 2 for the attachment of a sound collector or mouth piece 4' preferably of a cylindrical form as shown.

5 designates the transmitter diaphragm preferably of the flat disk form shown.

6 designates a cup-shaped skeleton carrying frame or spider formed with a marginal recess for the reception of the marginal portion of the diaphragm 5, which is secured in said recess by a marginal confining ring 7,

the parts being connected together by connecting screws or other usual means.

6' designates the central portion of the skeleton frame 6 aforesaid, formed with a central opening for the passage of the hereinafter described microphone member. In the preferred construction shown, said central portion 6' and the annular marginal portions of the skeleton frame 6 are integrally connected by radial arms 6'' as shown in Fig. 1.

8 designates a microphone block of carbon or like conductive material, formed with a peripheral positioning flange 9 at one end, and with a plurality of cells or recesses 10 in its front face for the reception of granules of carbon by which microphone properties are imparted to the structure, as usual in the present type of transmitters. Said microphone block 8 projects through the orifice of the central portion 6' of the skeleton frame 6, without electrical contact therewith, and is secured in insulated relation to the head 6 by an interposed insulating washer 11, a binding cap 12 of conductive material, and insulated binding screws 13, as shown in Fig. 1.

14 designates a contact finger attached to the transmitter shell 1, with its free end bearing against the binding cap 12, and adapted to electrically connect the microphone block 8 with a terminal member 15 of the transmitter shell 1. A companion contact finger, (not shown) will electrically connect the marginal portion of the skeleton frame 6 and diaphragm 5 with a companion terminal member of the transmitter shell.

The structure so far described is similar to that shown in my aforesaid application, Ser. No. 861,553, and no claim is made in this case to any of such structural features.

In the present improvement, 16 designates a plurality of resilient damper fingers pivotally mounted on the marginal confining ring 7 of the transmitter diaphragm 5, with their free ends in constant contact with the face of the diaphragm and adapted to be manually shifted toward or from the central portion of said diaphragm, to increase or diminish the damping action as required. A simultaneous adjustment of the aforesaid damper fingers 16 is preferably attained by gear formations 17 on the re-

spective fingers and having operative engagement with each other as shown.

18 designates a handle on one of the damper fingers 16 for the convenient manual  
5 adjustment of the mechanism.

Having thus fully described my said invention what I claim as new and desire to secure by Letters Patent, is:—

1. In a sound transmitter of the type described, the combination of a diaphragm, damping means adapted for contact with said diaphragm, a casing, an aperture in said casing, a handle connected through said aperture with said damping means, said  
10 handle being adapted for moving said damping means back and forth upon the diaphragm, substantially as set forth.

2. In a sound transmitter of the type herein described the combination of a diaphragm, a plurality of damping means piv-  
20 otally arranged adjacent to the margin of

the diaphragm with their free ends adapted for contact with said diaphragm and one common means for moving said plurality of damping means back and forth upon the  
25 diaphragm, substantially as set forth.

3. In a sound transmitter of the type herein described, the combination of a diaphragm, a plurality of damping means pivotally arranged adjacent to the margin of  
30 the diaphragm with their free ends adapted for contact with said diaphragm and adjustable to and from the central portion of said diaphragm, and means for imposing simultaneous movement on said plurality  
35 of damping means, the same comprising gear formations associated with the pivot portions of said damping means, substantially as set forth.

Signed at Chicago, Illinois, this 6th day 40 of July, 1916.

ALBERT E. COY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

COMBINATION PIANO AND SOUND  
REPRODUCING INSTRUMENT,

#1,230,324-----E. Plante,  
Patented-June 19th, 1917.  
Filed-June 13th, 1916.



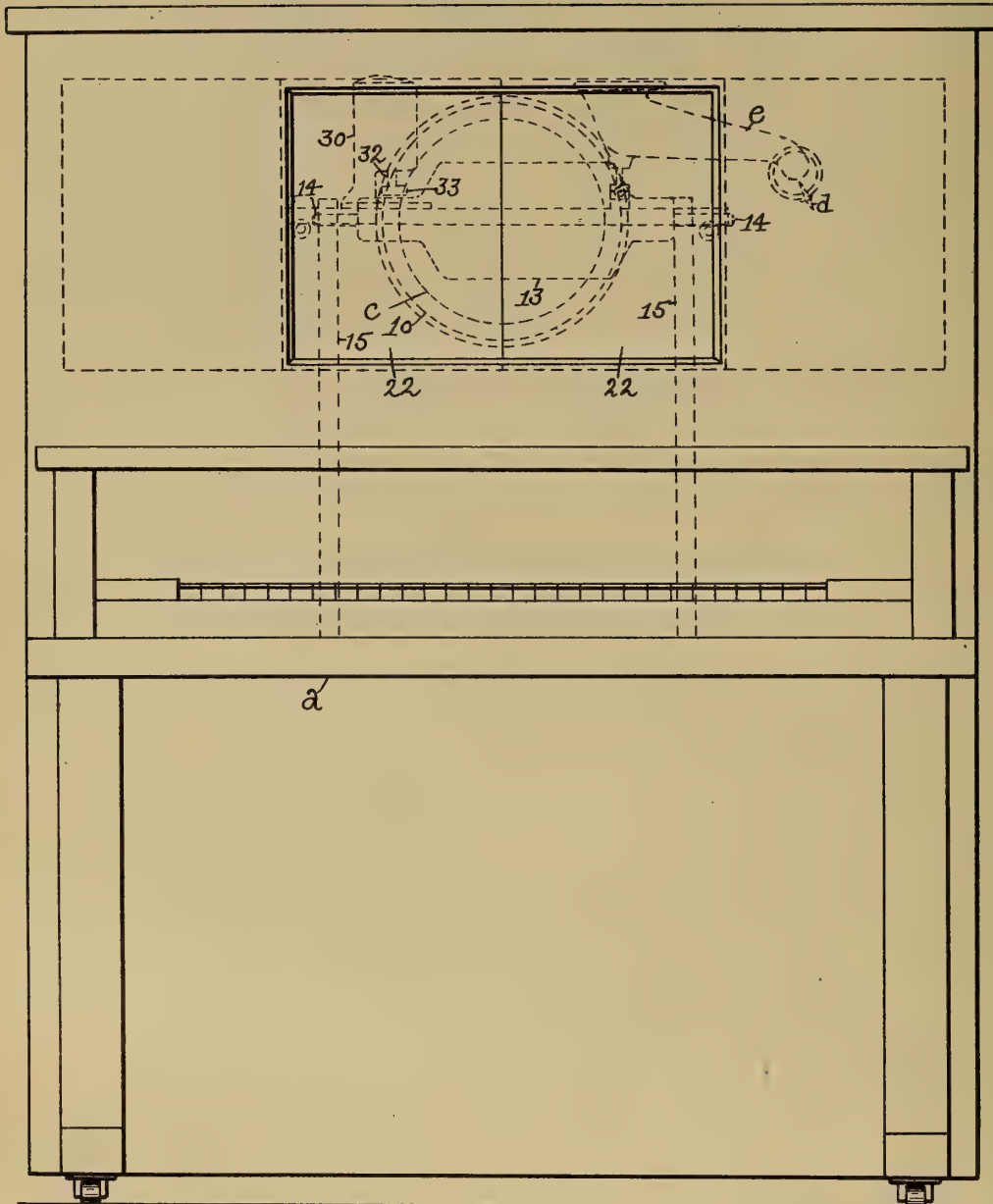
E. PLANTE.  
COMBINATION PIANO AND SOUND REPRODUCING INSTRUMENT;  
APPLICATION FILED JUNE 13, 1916.

1,230,324.

Patented June 19, 1917.

3 SHEETS—SHEET 1.

*Fig. 1.*



*Inventor*  
Elgear Plante  
by Jas. H. Churchill  
att'y.

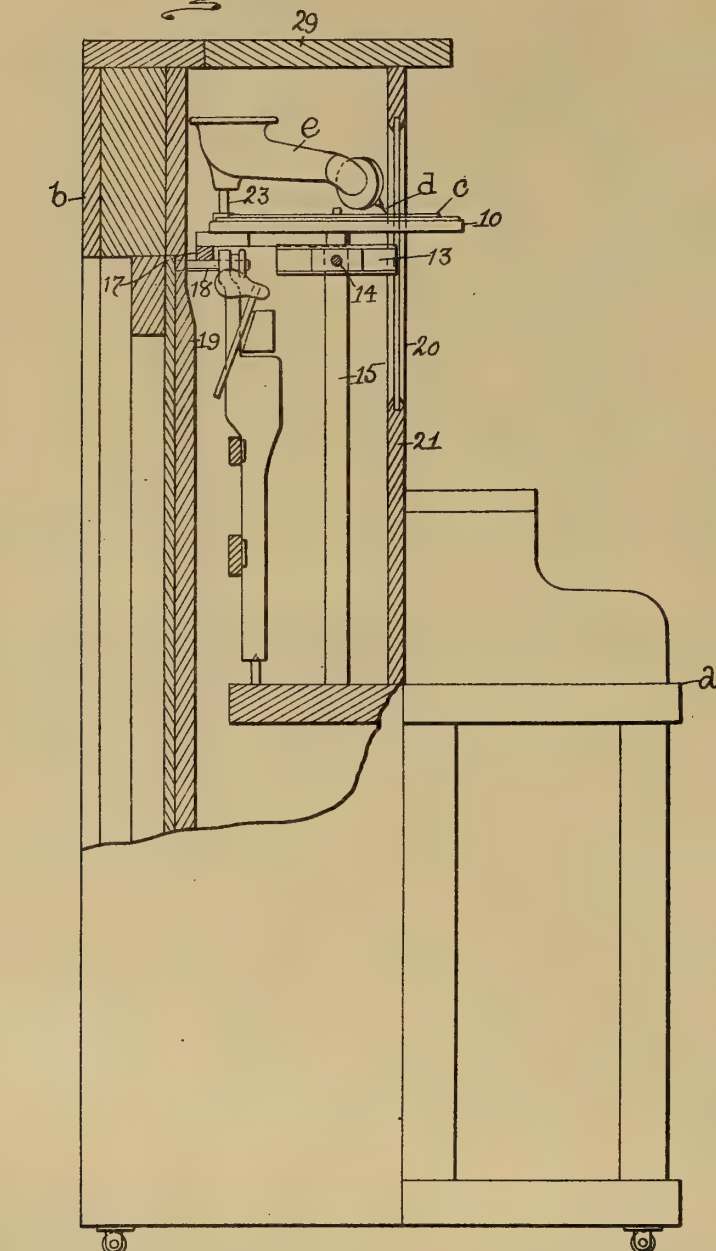


COMBINATION PIANO AND SOUND REPRODUCING INSTRUMENT.

Patented June 19, 1917.

3 SHEETS--SHEET 2.

*Fig. 2.*



*Inventor*  
Elgear Plante  
By Jas. H. Churchill  
att'y.



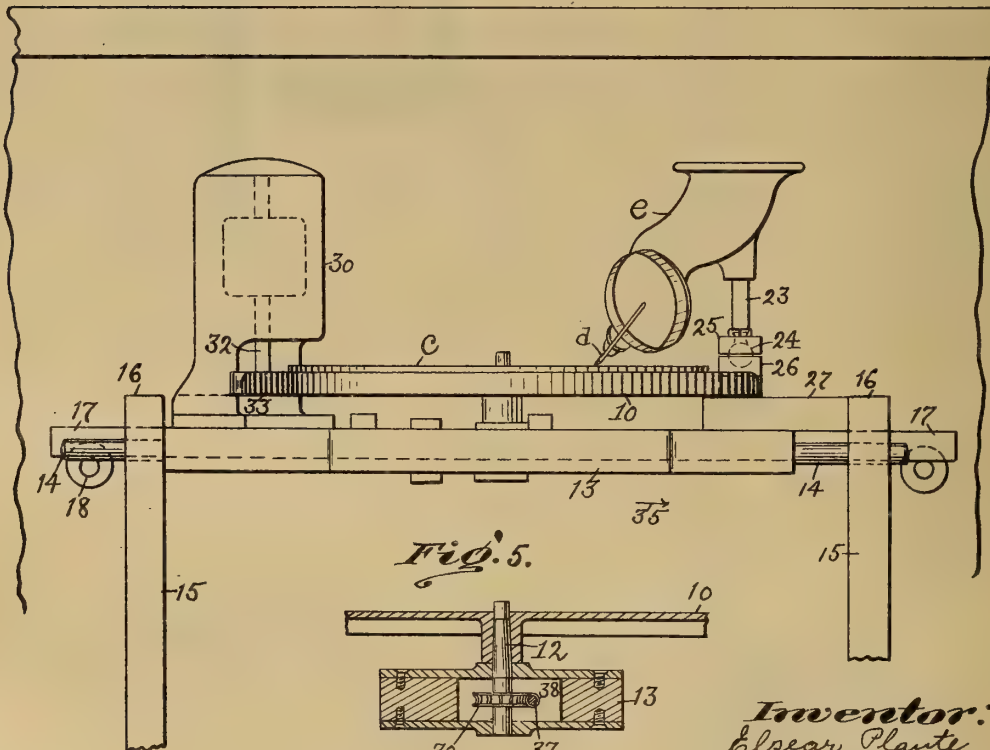
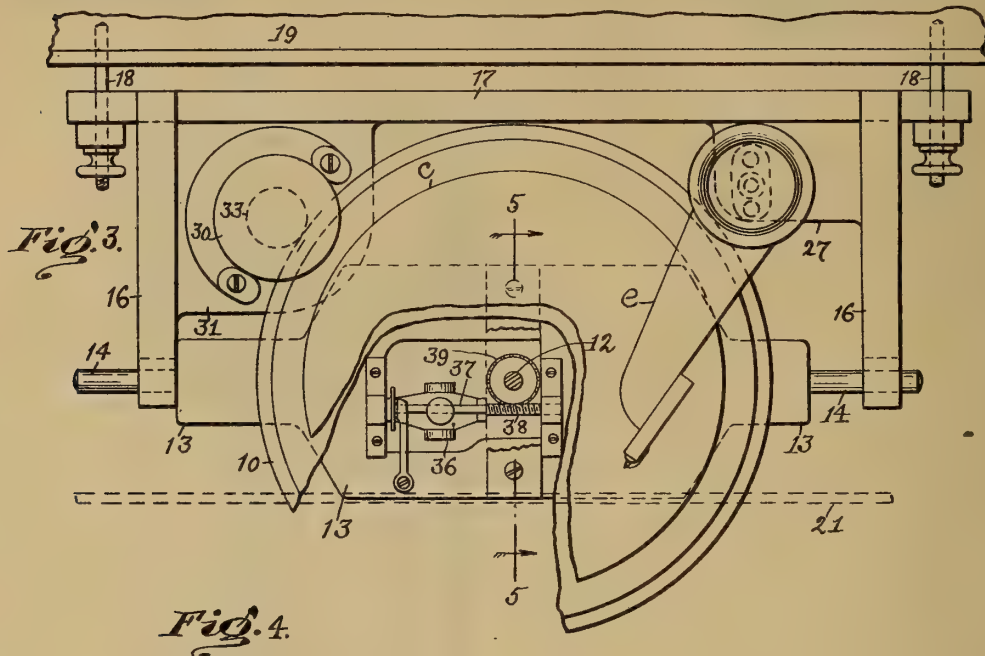


E. PLANTE.  
COMBINATION PIANO AND SOUND REPRODUCING INSTRUMENT.  
APPLICATION FILED JUNE 13, 1916.

1,230,324.

Patented June 19, 1917.

3 SHEETS—SHEET 3.



*Inventor:*  
Elgear Plante  
by Jas. H. Churchill  
att'y.

# UNITED STATES PATENT OFFICE.

ELZEAR PLANTE, OF FALL RIVER, MASSACHUSETTS, ASSIGNOR TO EDMOND COTÉ, OF FALL RIVER, MASSACHUSETTS.

COMBINATION PIANO AND SOUND-REPRODUCING INSTRUMENT.

1,230,324.

Specification of Letters Patent. Patented June 19, 1917.

Application filed June 13, 1916. Serial No. 103,556.

*To all whom it may concern:*

Be it known that I, ELZEAR PLANTE, a citizen of the United States, and a resident of Fall River, in the county of Bristol, in the State of Massachusetts, have invented an Improvement in Combination Pianos and Sound-Reproducing Instruments, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention has for its object to provide an upright piano with a sound reproducing instrument, which is normally located within the piano so as not to interfere with the functions of the latter, and forms a permanent part thereof, and has its tone arm or sound-delivering device arranged within the piano so that when in use, the outlet mouth of the tone arm is opposed to the non-metallic casing of the piano, whereby the sound-reproducing instrument is provided with a sounding board of large area and a superior tone effect free from metallic or harsh sounds is obtained. The sound-reproducing instrument may be of any suitable or known construction, in which a tone arm carrying a needle or stylus coöperates with a record which is mounted on a movable support usually a circular disk, which may be driven by a motor of any suitable construction, such as an electric motor or a spring motor.

Provision is made for enabling a record-carrying table or disk of maximum diameter to be located within a narrow chamber or space in the piano above the keyboard thereof, whereby the record-carrying table when not in use may be concealed from view within the piano and the latter have the appearance and function of an ordinary upright piano. To this end, the front wall of the casing above the keyboard is provided with an opening of sufficient size to enable a portion of the record-carrying table to be projected through the same when the sound-reproducing instrument is to be used, and the record-carrying table is mounted on a support, which is pivoted so as to permit the said table to be moved bodily and turned into a substantially horizontal position when in use and into a substantially vertical position when not in use, and the tone arm which coöperates with said record-carrying table is mounted within the piano casing so as to enable the tone arm to be moved into and

out of the path of bodily movement of the record-carrying table.

The piano may be a player piano or one which is manipulated by hand.

These and other features of this invention will be pointed out in the claims at the end of this specification.

Figure 1 is a front elevation of an upright piano provided with a sound-reproducing instrument in accordance with this invention.

Fig. 2, a side elevation and section of the piano shown in Fig. 1, the section being taken on the line 2—2, Fig. 1, with the sound-reproducing instrument in its operative position.

Fig. 3, an enlarged detail in plan of the sound-reproducing instrument shown in Fig. 2, with parts broken away.

Fig. 4, a front elevation of the sound-reproducing instrument shown in Fig. 2, and

Fig. 5, a detail in section on the line 5—5, Fig. 4, to be referred to.

Referring to the drawings, *a* represents an upright piano which may be of any suitable or well-known construction, such as now commonly in use, either a player piano or a hand-operated one.

The piano *a* is provided with a wooden or non-metallic casing *b*, which in accordance with the present invention has located within it a sound reproducing instrument, which may be of any well-known construction provided with a record or sound producing member *c*, usually in the form of a disk as herein shown, with which coöperates a needle or stylus *d* carried by a tone arm, horn or sound-delivering device *e*, which is mounted within the casing *b* so as to have its outlet mouth opposed and preferably in substantially close proximity to the casing *b*, whereby the latter constitutes a sounding board of large area for the sound-reproducing instrument.

The record or sound-reproducing member *c* is carried by a revolving table 10 mounted on a shaft 12 to turn therewith, and said shaft is mounted in a suitable base or support 13, which in the present instance is shown as capable of being turned from a substantially vertical position shown in Fig. 1 into a substantially horizontal position shown in Figs. 2, 3, and 4, and also capable of being moved longitudinally, for a purpose as will be described.

The base or support 13 herein shown is



provided at its ends with pivot pins 14, which are mounted to turn in side uprights or bars 15 forming part of a stationary frame within the casing *b*.

5 The stationary frame referred to may be of any suitable construction and is herein shown as consisting of the upright bars 15, end bars 16 supported upon the upright bars 15, and a rear cross bar 17, which  
10 latter rests upon screws or bolts 18 extended from the stationary vertical board 19 within the casing *b*.

The base or support 13 is pivotally mounted so that it can be turned into a substantially vertical position and be located  
15 entirely within the casing *b* when not in use, and when it is desired to use the same, the said base or support can be turned into a substantially horizontal position and projects through an opening 20 in the front  
20 wall 21 of the casing *b*, which opening may and preferably will be normally closed by one or more panels 22, which are arranged to be slid in opposite directions to uncover  
25 the said opening, when it is desired to use the sound-reproducing instrument.

Provision is made for moving the tone arm *e* from its inoperative position represented by dotted lines in Fig. 1, into its operative position represented in Figs. 2, 3  
30 and 4, and to this end, the tone arm is pivotally mounted within the casing *b*, which may be effected as herein shown by providing the tone arm *e* with a pivot rod 23  
35 having at its lower end a ball 24, which is frictionally secured by the clamping bar 25 to a bearing block 26 secured to a shelf 27 forming part of the stationary frame.

The tone arm *e* is arranged within the casing *b* so that its outlet mouth is opposed to a part of the casing *b*, and in the present  
40 instance, the mouth of the tone arm is shown as opposed to the cover 29 of the casing and in substantially close proximity thereto (see Fig. 2), whereby the casing of the piano  
45 acts as a sounding board for the sound-reproducing instrument.

The record carrying table 10 may be revolved by any suitable motor, such as now  
50 commonly used in instruments of this character, and in the present instance I have represented the table 10 as frictionally driven by an electric motor 30 mounted on a shelf 31 forming part of the stationary  
55 frame referred to, said motor having its armature shaft 32 provided with a friction wheel 33 which engages the circumference of the table 10, as represented in Figs. 3 and 4, when the table is in its horizontal or  
60 operative position, but from which said table is disengaged by movement of the table and its support or base 13 longitudinally in the direction of the arrow 35, Fig. 5, which movement brings the base and  
65 record-carrying table into a position in

which it is free to be turned into a substantially vertical position when not in use. The speed at which the table 10 is revolved may be regulated by a governor 36 (see Fig. 4), which has its shaft 37 provided with a worm  
70 38, which meshes with a worm gear 39 fast on the shaft 12, the governor, its shaft 37, worm 38 and worm gear 39 being carried by the base or support 13.

The electric motor 30 is supplied with  
75 current from a suitable source in any suitable or known manner and may be controlled by a suitable switch from outside the piano.

While it may be preferred to employ the  
80 electric motor for revolving the table 10 and the record *c* thereon, it is not desired to limit the invention in this respect, as the record table 10 may be revolved by a spring motor as now commonly practised in some  
85 instruments of this character, in which the spring motor is wound up by hand, or any other form of motor suitable for the purpose may be employed.

By reference to Fig. 1, it will be observed  
90 that the sound-reproducing instrument may be concealed from view when not in use, by the panels 22 which are closed, and that the piano has the appearance and functions of an ordinary piano.

When it is desired to use the sound reproducing instrument, the panels 22 are  
95 slid back so as to uncover the opening 20 in the front wall of the casing *b*, the support or base 13 is given a quarter turn upwardly from its vertical position indicated by dotted lines in Fig. 1 into its horizontal position shown in Fig. 2, the record *c* is placed on the table 10, the support 13 is  
100 then moved bodily in the direction opposite to that indicated by arrow 35, Fig. 5 to engage the table with the friction wheel 33, and the tone arm *e* is moved from its inoperative position shown in Fig. 1 into its operative position shown in Figs. 2, 3  
105 and 4.

The motor 30 is then started and the sound reproduced is thrown by the tone arm *e* against the casing *b*, which acts as  
110 a sounding board of extensive area, with the result that a superior tone effect free from harsh or metallic sounds is produced.

When one record has been played, the operator swings the tone arm out of the path of bodily movement of the record table and into the position indicated by dotted lines, Fig. 1, stops the motor, removes the record and places a new record on the table, after which he swings the tone arm  
120 over upon the new record and starts the motor. When the operator has finished playing the records, he stops the motor, swings the tone arm to one side, removes the record, then moves the record table and its support so as to clear the motor and  
125 130

turns the said support on its pivot a quarter turn downwardly and brings the said support and table into a vertical position within the piano casing, after which the panels  
5 are closed and the piano has the appearance and function of an ordinary piano as indicated in Fig. 1.

When the record table is turned from its horizontal position into its vertical position, the front portion of said table moves in the opening in the wall of the piano casing, which enables a record table of maximum size to be located in an upright piano casing having a space or chamber of a width  
15 less than the diameter of the record-carrying table.

I have herein shown one construction of sound-reproducing instrument but it is not desired to limit the invention to the particular construction shown.  
20

It will be observed that the casing *b* for the piano also constitutes the casing for the sound-reproducing instrument.

Claims:

25 1. The combination with an upright piano having a casing provided with an opening in its front wall and with means for covering and uncovering said opening, a support or base for a record-carrying table pivoted  
30 within the said casing to be turned into a substantially vertical position substantially

parallel with said opening and into a substantially horizontal position at an angle to said opening, said record-carrying table being movable with said support, a motor  
35 located in said casing for rotating said record-carrying table, and a tone-arm pivoted within said casing and movable over said table when the latter is in its horizontal position.  
40

2. The combination with an upright piano having a casing provided with an opening in one of its walls, a support or base for a record-carrying table pivoted within said casing to be turned from a substantially vertical position into a substantially horizontal position and arranged with relation to said opening to enable a portion of the record-carrying table carried by said support to  
45 move through said opening when said support is turned, a motor for rotating said record-carrying table, and a tone arm pivoted within the casing out of the path of movement of the record-carrying table and having its free end movable into and out  
50 of the path of movement of said record-carrying table and over the latter when the record-carrying table is in its horizontal position.  
55

In testimony whereof, I have signed my name to this specification.  
60

ELZEAR PLANTE.



*[The following text is extremely faint and largely illegible due to the quality of the scan. It appears to be a historical document, possibly a letter or a page from a book, containing several paragraphs of text. A small red mark is visible near the top center of the page.]*



112 30.487.

ANNOTATOR FOR COMMERCIAL  
PHONOGRAPHS,

#1,230,485-----M. L. Hunter, *A. B. Church,*

Patented-June 19th, 1917.

Filed-January 25th, 1917.

M. L. HUNTER & A. B. CHURCH.  
 ANNOTATOR FOR COMMERCIAL PHONOGRAPHS.  
 APPLICATION FILED JAN. 25, 1917.

1,230,485.

Patented June 19, 1917.

2 SHEETS—SHEET 1.

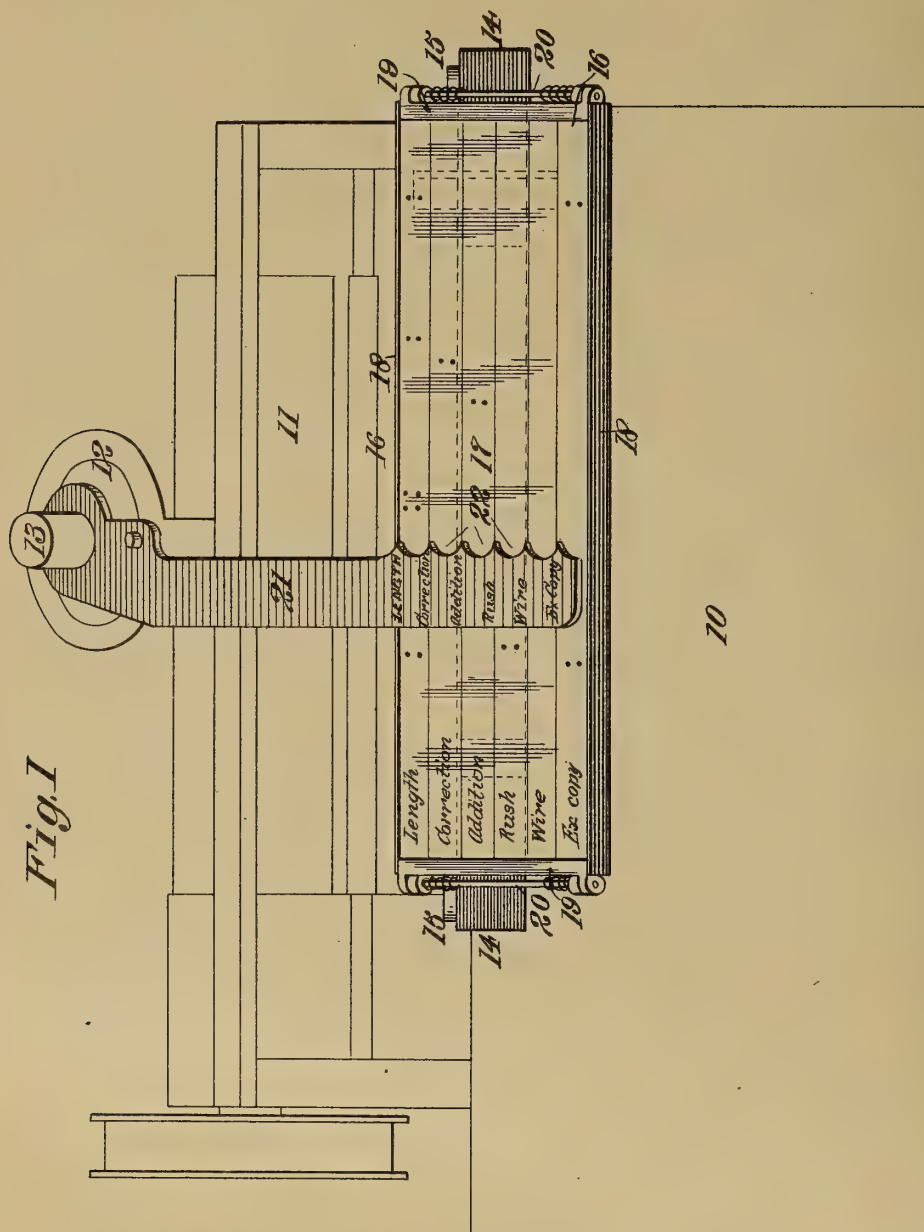


Fig. 1

WITNESSES:

*Charles Reckles*  
*Thos. Eastberg*

INVENTORS

*Martha I. Hunter,*  
*Albert B. Church*

BY *Strong & Townsend*  
 ATTORNEYS





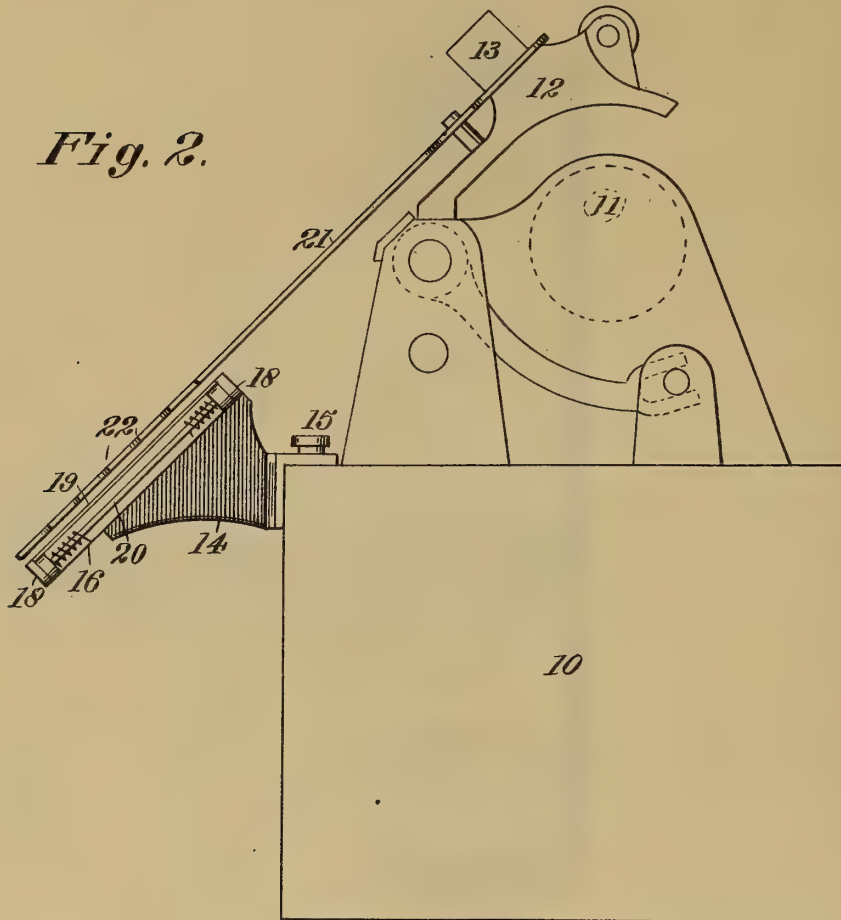
M. L. HUNTER & A. B. CHURCH.  
ANNOTATOR FOR COMMERCIAL PHONOGRAPHS.  
APPLICATION FILED JAN. 25, 1917.

1,230,485.

Patented June 19, 1917.

2 SHEETS—SHEET 2.

*Fig. 2.*



WITNESSES:

*Charles Pokles*  
*Thos. Eastberg*

INVENTORS

*Martha L. Hunter*  
*Albert B. Church*

BY *Strong & Townsend*  
ATTORNEYS

# UNITED STATES PATENT OFFICE.

MARTHA L. HUNTER AND ALBERT B. CHURCH, OF SAN FRANCISCO, CALIFORNIA.

ANNOTATOR FOR COMMERCIAL PHONOGRAPHS.

1,230,485.

Specification of Letters Patent. Patented June 19, 1917.

Original application filed September 15, 1915, Serial No. 50,780. Divided and this application filed January 25, 1917. Serial No. 144,564.

*To all whom it may concern:*

Be it known that we, MARTHA L. HUNTER and ALBERT B. CHURCH, both citizens of the United States, residing at the city and county of San Francisco and State of California, have invented new and useful Improvements in Annotators for Commercial Phonographs, of which the following is a specification.

This invention relates to commercial phonographs, and is a division of our co-pending application, Serial No. 50,780, filed September 15, 1915.

The object of this invention is to provide an attachment for a transcribing phonograph whereby from a memo sheet previously marked up with various instructions applying to the matters contained in the phonograph record, the transcriber may locate upon the record the position of the matters to which said instructions apply.

Heretofore, it has been proposed to supply a specially printed sheet, properly ruled and provided with stock phrases, said sheet to receive upon its face penciled marks made by the dictator to convey the necessary information relative to the matters in the record for the convenience of the transcriber. Great difficulty has been encountered by users of this memo sheet in properly locating from the marks thereon the position in the phonograph record of the matters to which such marks apply.

In the present invention this objection has been overcome by the provision of mechanical means for carrying on these operations, whereby greater precision and accuracy are obtained.

In carrying out the object of this invention we employ a holder, fastened to the box of the transcribing phonograph, to receive sheets of memo paper previously marked with various instructions relating to the matters contained in the phonograph record, and means movable with the traveling head of the phonograph to indicate in advance to the transcriber the exact position and location on the phonograph record of the matters to which the marks on the sheet apply.

One form which our invention may assume is exemplified in the following description and illustrated in the accompanying drawings, in which—

Figure 1 shows a front elevation of the

transcribing attachment applied to a phonograph.

Fig. 2 shows a side elevation of the device illustrated in Fig. 1.

In the drawings, a phonograph is shown comprising a box 10, a cylindrical record 11, and a movable head 12. The latter is provided with a reproducer 13. Attached to the front side of the box, by suitable brackets 14 and thumb-screws 15, is a holder 16.

A sheet 17 is marked during the process of dictating with various instructions applying to the matters contained within the record. It should indicate whether a letter should be single or double spaced; the location of letters and telegrams which should be transcribed first; letters of which extra copies are required, etc.

When transferring the record to the transcribing machine, the memo sheet is introduced in the holder 16. This holder comprises a base plate carried in inclined position with flanged sides 18, on the ends of which are spring-pressed clips 19 pivoted to rods 20, for retaining the sheet in a flattened position thereon. Rigidly connected to the reproducing device 13 of the transcribing machine is an indicator plate 21 positioned to travel across the holder and provided with indicating notches 22 labeled to correspond with the items on the memo sheet. Thus the operator is enabled to locate the position of the various matters in the record to which the marks on the memo sheet apply merely by sliding the reproducing device, to which the indicator plate is attached upon the record, until the notches on said plate register with the various marks on the paper. These marks, while here shown in the form of dots, may be of any nature, or may be the printed word itself.

Various changes in construction and arrangement of the parts may be employed without departing from the spirit of our invention as disclosed in the appended claims.

Having thus described our invention, what we claim and desire to secure by Letters Patent is—

1. In combination with a commercial phonograph and a holder rigidly connected thereto, a stationary sheet having longitudinally arranged instructions thereon carried by said holder, and an indicator connected to the traveling head of the phonograph and

extending over and across said sheet, said indicator having indicia thereon extending transversely thereof and in alinement with the respective longitudinally arranged instructions of said sheet.

2. In combination with a commercial phonograph, an inclined holder, brackets connected to the holder and formed with right angled parts to engage over the front and top meeting edges of the phonograph case, a stationary sheet having longitudinally arranged instructions thereon carried by said holder, and an indicator connected to the traveling head of the phonograph and

extending over and across said sheet, said indicator having indicia thereon extending transversely thereof and in alinement with the respective longitudinally arranged instructions of said sheet.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

MARTHA L. HUNTER.  
ALBERT B. CHURCH.

Witnesses:

M. V. COLLINS,  
H. M. MOORE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



STOP FOR SOUND REPRODUCING  
MACHINES,

#1,230,505-----F.A.Nolan,  
Patented-June 19th, 1917.  
Filed-January 22nd, 1915.

F. A. NOLAN.  
STOP FOR SOUND REPRODUCING MACHINES.  
APPLICATION FILED JAN. 22, 1915.

1,230,505.

Patented June 19, 1917.  
2 SHEETS—SHEET 1.

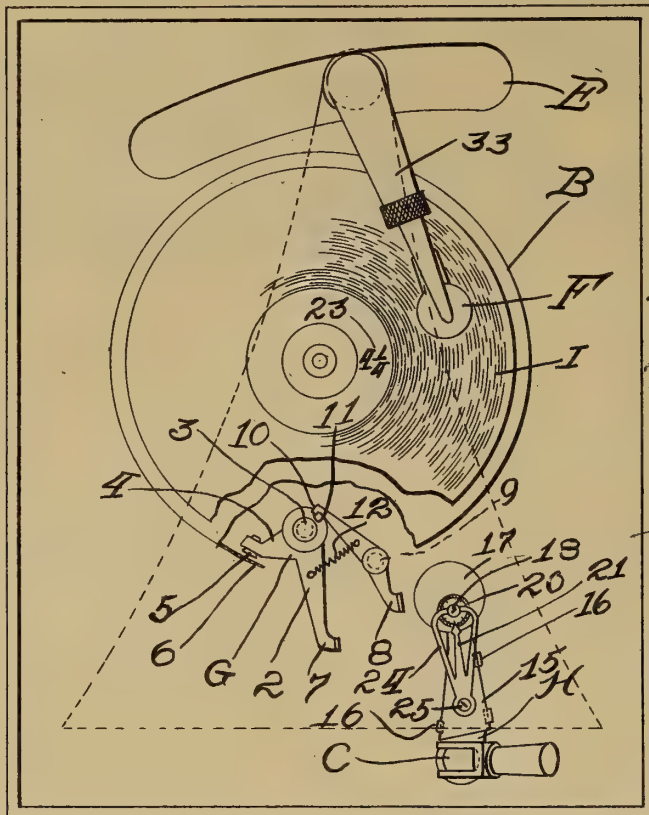


Fig. 1.

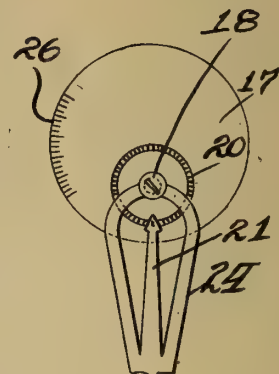
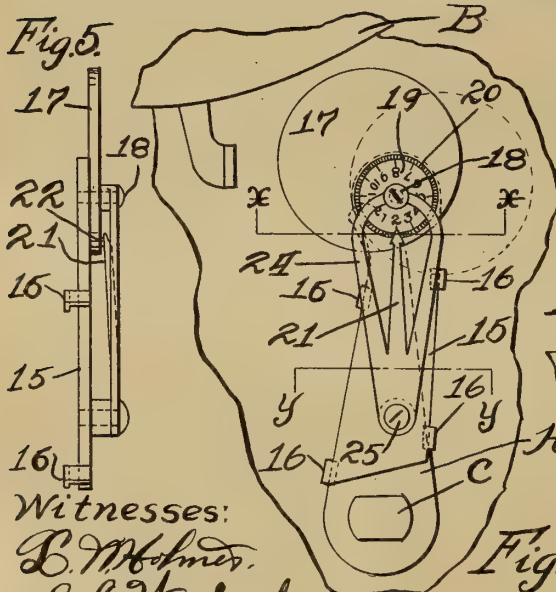


Fig. 6.



Witnesses:  
B. M. Jones.  
S. L. Veechenhuizen

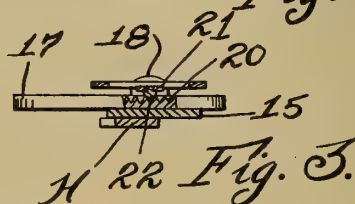


Fig. 3.

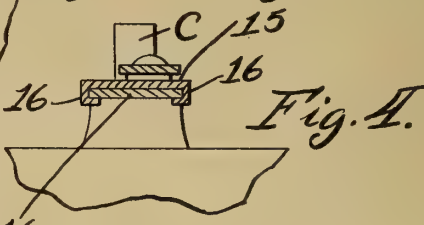


Fig. 4.

Inventor:  
Francis A. Nolan,  
Fig. 2. By: J. S. Bradbury,  
Attorney.

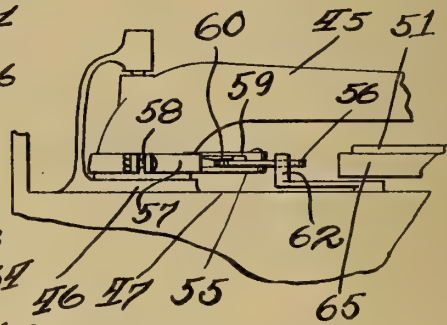
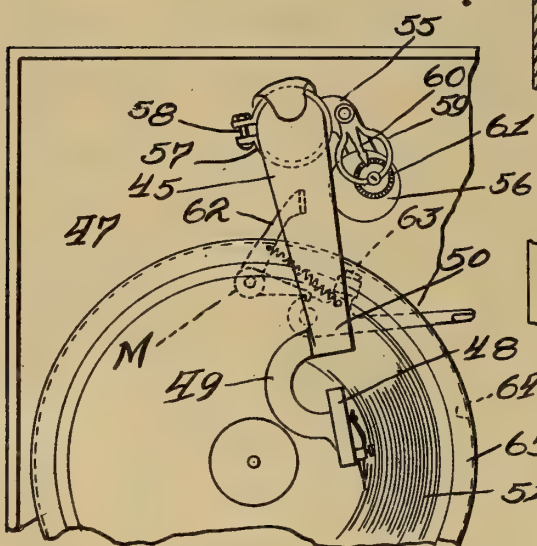
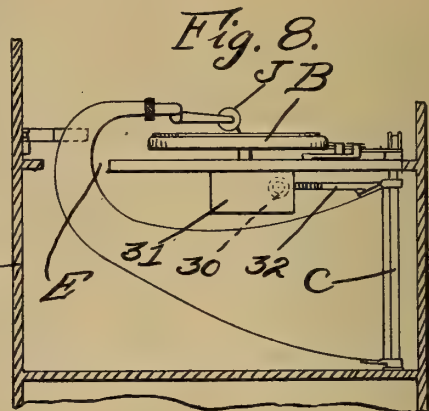
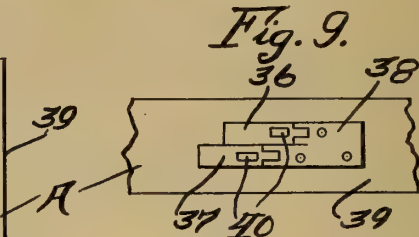
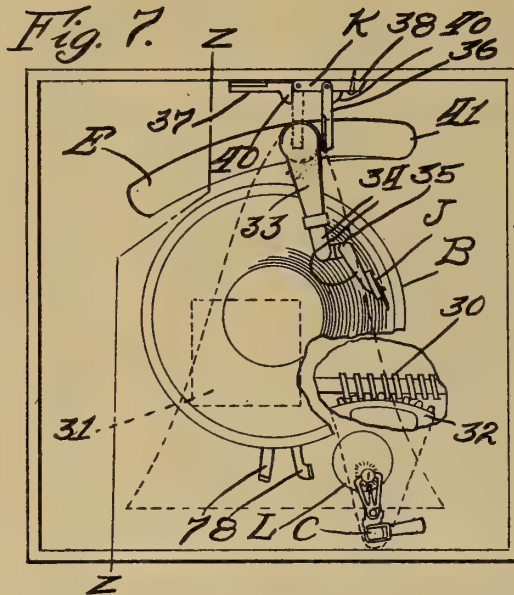




F. A. NOLAN.  
STOP FOR SOUND REPRODUCING MACHINES.  
APPLICATION FILED JAN. 22, 1915.

1,230,505.

Patented June 19, 1917.  
2 SHEETS—SHEET 2.



*Fig. 10.*  
Witnesses:  
L. M. Holmes.  
S. L. Kaichenberger

Inventor:  
Francis A. Nolan.  
By: L. Shadbury  
Attorney.

# UNITED STATES PATENT OFFICE.

FRANCIS A. NOLAN, OF ST. PAUL, MINNESOTA.

STOP FOR SOUND-REPRODUCING MACHINES.

1,230,505.

Specification of Letters Patent. Patented June 19, 1917.

Application filed January 22, 1915. Serial No. 3,763.

*To all whom it may concern:*

Be it known that I, FRANCIS A. NOLAN, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented a new and useful Improvement in Stops for Sound-Reproducing Machines, of which the following is a specification.

The primary object of this invention is the production of a simple and inexpensive stop which can be easily and quickly applied to sound reproducing machines for automatically setting the brake and stopping the rotation of the turn table upon which the record is carried immediately when the playing of a record is completed.

A further object is the production of a device of its kind, which can be attached to the sound reproducing machine without changing or reconstructing any of the mechanism of the latter.

A still further object is to provide a device of the kind stated, which will stop any record immediately when a predetermined point near the end of the sound groove is reached by the stylus or sound box and which can easily be attached to or detached from the machine. To these ends my invention consists of the features of construction and combinations of parts, which will be hereinafter more particularly described and set forth in the claims.

In the accompanying drawings forming part of this specification, Figure 1 is a plan view of a sound reproducing machine, showing my invention applied thereto, a portion of said machine being broken away to expose part of the mechanism; Fig. 2 is a plan of a detail of the construction illustrated in Fig. 1; Fig. 3 is a section taken on the line X—X, Fig. 2; Fig. 4 is a section taken on the line Y—Y, Fig. 2; Fig. 5 is an edge view of my attachment removed from its support, which is illustrated in Fig. 2; Fig. 6 is a plan of a detail of my attachment illustrating an alternative construction, in which the indicator scale is marked in a different position on the eccentric; Fig. 7 is a plan illustrating my invention applied in use with a different type of sound reproducing machine; Fig. 8 is a section taken upon the line Z—Z, Fig. 7; Fig. 9 is a side view of a detail of the construction illustrated in Fig. 7; Fig. 10 is a plan of a detail of another construction of sound reproducing machine illustrating my improvement applied thereto, and Fig. 11

is a side view of a detail of the construction illustrated in Fig. 10.

My invention is applicable to sound reproducing machines of various types, the drawings illustrating two of the commonly called Edison types, and one of the Victor type, it being understood that the invention can be attached to other forms and is not confined to the particular types illustrated.

In the drawings, A designates the casing of a sound reproducing machine, in which is contained a motor not illustrated of usual type for revolving the turn table B, said casing having revolubly mounted thereupon by means of the vertical shaft C, the usual amplifying horn or tube, the small end of which extends upwardly through the opening E or slot in the top of the casing, and projects forwardly over the turn table and carries upon its forward end the usual sound box F. Placed upon the top of the casing is the brake device G, which may be of any desired construction, that illustrated consisting of a bell crank lever 2 secured to the casing by the pivot 3 and having one arm 4 provided with a brake shoe 5, which is adapted to press against the downturned rim 6 of the turn table to stop the latter from revolving. The long arm 7 of the bell crank lever projects outwardly from below the turn table and is primarily for moving the brake shoe back clear of the rim of the turn table, permitting the turn table to revolve freely. Positioned adjacent the bell crank lever is a releasable catch consisting of an arm 8 pivoted by the pin 9 on the top of the casing and having its inner end provided with a shoulder 10, which is adapted to engage in a notch 11 in the hub portion of the bell crank lever to lock the bell crank lever with its brake shoe in released position. The outer end of the arm 8 projects beyond the periphery of the turn table in position, so that the arm can be turned upon its pivot. The compression spring 12 secured to the arm 8 and the bell crank lever as illustrated tends to hold the catch engaged with the bell crank lever. Upon releasing the shoulder 10 from the notch 11 by turning the arm 8 the spring immediately turns the bell crank lever and forces the shoe 5 against the flange 6 of the turn table and stops the machine. This part of the mechanism can be operated by hand when desired, the starting of the machine being accomplished by swinging the bell crank with the shoe 5 back until the catch



engages in the notch 11 and holds the bell crank locked and the stopping of the machine being accomplished by pressing the catch arm until it releases from engagement with the bell crank, whereupon the shoe 5 presses upon the flange 6 and stops the turn table.

My improved adjustable stop may be applied to the shaft, journal or turning portion of the amplifying horn, its mode of application and construction being varied to suit the requirements of the design and form of apparatus to which it is desired to apply the invention. As illustrated in Figs. 1 to 5, the pivot shaft C projects above the top of the casing and to its upward projecting portion is secured a radiating arm H, which tapers outwardly toward the turn table in front of the outwardly projecting portion of the catch arm 8. The sound reproducing machine thus far described to which my invention is applied is the conventional Edison type of machine. To this radiating arm H which turns with the shaft C is detachably secured a support 15 in the form of a narrow plate having down and inwardly turned clips 16, which slide and engage over the edges of the arm H and hold the support 15 firmly secured on said arm. The outer end of this arm carries an eccentric disk 17, which is pivoted by means of the screw 18 passing through said disk and threaded into engagement with said support. This eccentric disk is positioned in the path of the outer end of the releasable catch arm 8, so that as the pivot shaft C turns said disk approaches the arm 8 until it strikes the same and releases it from engagement with the brake, whereupon the brake stops the turn table.

It will thus be observed that according to the position into which the eccentric is turned, the time at which the disk is stopped is varied and as the sound record grooves in record disks such as I vary in length, it is desirable to set the eccentric so that it will stop the record from revolving at a predetermined time. Accordingly the disk 17 is provided on its face with a graduated scale 19 arranged concentric with the pivot screw 18, upon which the eccentric is journaled, and in order to hold the disk set in selected position, a series of ratchet teeth 20 are also formed in the disk in a circle concentric with said pivot screw and scale. A spring dog 21 having a downwardly tapering catch shoulder 22 sweeps over and engages with said teeth to hold the eccentric positioned. The markings on the scale 19 will indicate according to markings such as 23 previously placed upon the record disk the position in which the eccentric 17 should be adjusted below the dog 21 to stop the record, as soon as it has been played. The dog 21 is in the form of a spring arm pressing downwardly

and formed integral with a skeleton frame 24, which is fastened at one end adjacent the free end of the dog 21 below the head of the screw 18, and by its opposite end upon the support 15 by means of the screw 25. The free end of the dog 21 is formed in the shape of a pointer, which is adapted to indicate on the scale 19, the number to which the eccentric disk should be moved to correspond with the number or marking upon the record. The number of ratchet teeth 20 with which the shoulder 22 on the dog 21 engages may serve to determine the position into which the stop disk 17 is turned by counting or by feeling or hearing the number of clicks made. Thus my improved stop may be accurately positioned by observing the numbers, or fractions thereof, on the dial, as when the device is played in a lighted room; or by listening to the number of clicks or feeling the impacts made as the disk is set, as may be necessary when the device is played in dark or unlighted room.

This attachment can easily be placed upon the arm H for use or removed when desired, and its simplicity, which is reduced to a minimum, commends itself for practical service. Its adjustability permits it to be set easily and quickly to pre-arrange the stopping of the record at the desired instant, as soon as the latter has been played.

In Fig. 6 the scale 26 is marked upon the periphery of the eccentric disk instead of being arranged in a circle concentric with the pivot point of said disk as in the construction above described. In this construction the pointer likewise may register with the scale so that the eccentric disk can be set at the desired position to stop the record, the changes permitting minute adjustment of the disk to stop the record at the exact position desired.

In the construction of sound reproducing machine illustrated in Figs. 7, 8 and 9 of the drawings my improved adjustable stop is applied to the pivot shaft C in the same manner as illustrated in Fig. 1 above described. The amplifying horn is fed positively in the usual manner, such as by the feed screw 30 extending from the motor 31 with its teeth in mesh with the feed quadrant 32, thus adapting the sound box as illustrated in Fig. 1 to be positively fed when playing from the usual Edison record. When a Victor record is played, the sound box J is attached to the sound conducting tube 33 through the medium of a universal connection 34, 35, the connection being joined at one extremity to the reduced forwardly projecting portion of the amplifying horn and at its other extremity to the sound box, as shown, said joint permitting free lateral and vertical motion of the sound box. By this means, the sound box is fed automatically by the groove itself instead



of being fed synchronously with the record groove. In connection with this apparatus a gage K is employed having two arms 36 and 37 hinged from a support 38, which is  
 5 secured to the casing 39. These arms are similar in construction, each being provided with a stop 40, which defines the outward movement of the arm and holds it in blocking position in the path of the portion of  
 10 the amplifying horn projecting up through the passage 41 in the top of the casing. These arms are distributed to determine the starting point of the swinging amplifying horn. For instance when a ten inch or small  
 15 sized record is played, the arm 37 is swung into outermost position, and the horn set to start feeding by being moved against said arm and when a 14 inch or large sized record is played, the arm 37 is swung down,  
 20 and the arm 36 swung out as illustrated in Fig. 7, and the amplifying horn moved into the position illustrated in Fig. 7 against the arm 36. During the subsequent playing of the record, the motor 31 causes the feeding mechanism to feed the sound amplifying  
 25 horn positively and the freely disposed sound box is adapted to automatically feed forwardly by engagement with the record groove in the disk partly independent of the forward positive feed of the horn. By  
 30 this construction my improved automatic stop L similar in construction to that employed as illustrated in Fig. 1 is adapted to accurately stop the revolution of the turn table precisely at the end of the record  
 35 which is played. The disclosures presented in Fig. 7 are patterned after the conventional machine now on the market and, of course, no claim is made thereto, it being shown and described somewhat in detail so  
 40 that the operation of my improved stop may be readily understood.

In Figs. 10 and 11 details of the ordinary Victor sound reproducing machine are illustrated, 45 indicating the sound arm, which is swiveled at 46 upon the top of the casing 47, to swing horizontally and laterally. 48 indicates the usual sound box mounted upon the tube 49, which is swiveled in the free  
 50 end of the arm 45 at 50 to swing freely up and down. In this construction, the record such as 51 is adapted by its sound groove being engaged by the needle in the sound box to feed the sound box automatically  
 55 while the machine is in operation and my improved adjustable stop is attached to the shaft, journal or turning portion of the sound conducting arm in the same manner as in the constructions above described, excepting that the structure of the stop is  
 60 slightly modified, so that the stop can be easily and quickly attached to the arm 45 in the manner above set forth. The adjustable stop has its supporting arm 55 carrying the eccentric 56 formed with a split  
 65

collar 57, which is clamped around the elbow portion of the sound conducting arm 45 by means of the bolt 58. The support 55 carries the frame 59, which is formed with the dog member 60, similar to the part 21 illustrated in Fig. 1, which performs the same  
 70 function of releasably engaging the teeth 61 in the eccentric disk 56. The brake mechanism M is substantially similar in construction to the brake mechanism G, illustrated in Fig. 1 and the eccentric 56 is positioned by the arm 45, so as to strike the  
 75 release member 62 and cause the brake shoe 63 to impinge against the rim 64 of the turn table 65 and stop the table from revolving at a predetermined time. The adjusting of the eccentric by turning the same in the manner stated in connection with the description set forth in Fig. 1 determines  
 80 the exact point during the playing of a record at which the turn table is stopped. 85

The stop also by its scale is adapted to register the point at which the record should be stopped and the records can subsequently be marked accordingly by pasters or other  
 90 means of identification. A chart can easily be kept showing the marks upon the records and from which it can be determined in advance at what point the eccentric should be set to stop the machine for any record. The  
 95 marks can be imprinted in the records, as they are made when desired.

In all of the constructions set forth describing the application of my invention to sound reproducing machines, the adjustable  
 100 stop is attached to the shaft, journal or turning portion of the sound conducting horn or arm, thereby simplifying construction and applying the stop at the most effective part of the apparatus to accurately and  
 105 positively cause the turn table to stop at a predetermined point during the playing of a record. Further in all of the constructions set forth, it is easy to adjust the stop to co-operate with any record that is played, and  
 110 pre-arrange the stopping of the machine, in accordance with the length of sound groove in such record.

In accordance with the patent statutes, I have described the principles of operation  
 115 of my invention, together with the apparatus which I now consider to represent the best embodiment thereof, but I desire to have it understood that the construction shown is only illustrative, and that the invention can be carried out by other means  
 120 and applied to uses other than those above set forth within the scope of the following claims.

Having described my invention, what I claim as new and desire to protect by Letters Patent is:—

1. The combination in a sound reproducing machine having a traveling element, a turn table and brake mechanism to prevent  
 130



the table revolving, of a supporting arm detachably secured to said traveling element, and means carried by said supporting arm adapted for a multiplicity of adjustments relative thereto and about a vertical axis adjacent its free end to impinge against and set said brake mechanism at a predetermined point during the travel of the table.

2. The combination in a sound reproducing machine having a traveling element, a turn table and brake mechanism to prevent the table revolving, of a supporting member detachably secured at one end to said traveling element, and means journaled upon said member adapted for a multiplicity of adjustments relative thereto and about an axis adjacent and at a right angle to its free end to directly impinge against and set said brake mechanism at a predetermined time.

3. The combination in a sound reproducing machine having a traveling element, a turn table and brake mechanism to prevent the table revolving, of a supporting member detachably secured at one end to said traveling element, and eccentric means journaled upon said member for a multiplicity of relative adjustments with respect thereto about an axis adjacent its free end and adapted to directly impinge against and set said brake mechanism at a predetermined time.

4. The combination in a sound reproducing machine having a traveling element, a turn table and brake mechanism to prevent the table revolving, of a supporting member detachably secured to said traveling element, an arm detachably carried by said supporting member, and means journaled upon said arm adapted for relative adjustment with respect thereto so as to directly impinge against and set said brake mechanism at a predetermined time.

5. The combination in a sound reproducing machine having a traveling element, a turn table and brake mechanism to prevent the table revolving, of a supporting member detachably secured to said traveling element, an arm carried by said supporting member, and eccentric means journaled upon said arm adapted for relative adjustment with respect thereto so as to directly impinge against and set said brake mechanism at a predetermined time.

6. The combination in a sound reproducing machine having a traveling element, a turn table and brake mechanism to prevent the table revolving, of a supporting member detachably secured to said traveling element, an arm detachably carried by said supporting member, and eccentric means journaled upon said arm adapted for relative adjust-

ment with respect thereto so as to directly impinge against and set said brake mechanism at a predetermined time.

7. The combination in a sound reproducing machine having a traveling element, a turn table and brake mechanism to prevent the table revolving, of a member secured to said traveling element and comprising a plurality of supporting arms detachably connected together and lying in substantially the same plane, and means carried by said supporting arms for relative adjustment with respect thereto so as to directly actuate the setting of said brake mechanism at a predetermined time.

8. The combination in a sound reproducing machine having a traveling element, a turn table and brake mechanism to prevent the table revolving, of a supporting member secured to said traveling element, a disk journaled eccentrically on said member having ratchet teeth arranged in a series concentric with the journal point of said disk and adapted to be adjustably positioned to impinge against and set said mechanism at a predetermined time, and spring means co-acting with said teeth to retain said disk in selected position.

9. The combination in a sound reproducing machine having a traveling element, a turn table and brake mechanism to prevent the table revolving, of a supporting member removably secured to said traveling element, a disk journaled eccentrically on said member and adapted for relative adjustment with respect to said member so as to directly impinge against and set said brake mechanism at a predetermined time, and means for retaining said disk in selected position.

10. The combination in a sound reproducing machine having a traveling element, a turn table and brake mechanism to prevent the table revolving, of a supporting member removably secured to said traveling element, a graduated disk journaled eccentrically on said member and adapted for relative adjustment with respect thereto so as to impinge against and set said brake mechanism at a predetermined time, means for retaining said disk in selected position, and a finger coöperating with the graduations on said disk to indicate the relative position at which said disk is adapted to set said brake.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

FRANCIS A. NOLAN.

Witnesses:

STELLA L. WASCHENBERGER,  
F. G. BRADBURY.

STOP,  
 #1,230,506-----F.A.Nolan,  
 Patented-June 19th, 1917.  
 Filed-June 25th, 1915.



STOP.

**1,230,506.**

Patented June 19, 1917.

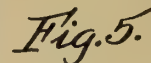


Fig. 4. Inventor:  
Francis R. Nolan:  
by: *L. S. [Signature]* Attorney.

# UNITED STATES PATENT OFFICE.

FRANCIS A. NOLAN, OF ST. PAUL, MINNESOTA.

STOP.

1,230,506.

Specification of Letters Patent. Patented June 19, 1917.

Application filed June 25, 1915. Serial No. 36,221.

*To all whom it may concern:*

Be it known that I, FRANCIS A. NOLAN, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented a new and useful Improvement in Stops, of which the following is a specification.

My invention relates to improvements in stops which can be applied to sound reproducing and analogous machines for automatically setting a brake and stopping the mechanism at a predetermined time.

An object of my invention is to stop the playing of a record of a sound reproducing machine immediately when a predetermined point near the end of the sound groove is reached by the stylus or sound box.

A still further object is the production of a device of the kind stated, which can be easily attached to or detached from sound reproducing machines now in general use without altering the general construction of the machines. Still further objects are simplicity in construction and greater effectiveness in use than with devices heretofore designed for the purposes stated.

To these ends my invention comprises the features of construction and combination of parts which will be hereinafter more particularly described and set forth in the claims.

In the accompanying drawing forming part of this specification, Figure 1 is a plan of my invention; Fig. 2 is a section taken on the line X—X, Fig. 1; Fig. 3 is a plan of a sound reproducing machine of the conventional Edison type to which my invention is shown applied, part of the structure of the machine being broken away to more clearly expose its mechanism; Fig. 4 is a plan of an alternative construction of my invention, and Fig. 5 is a section taken on the line Y—Y of Fig. 4.

In the drawing A indicates a support or base in the form of an arm upon one end of which is rotatably mounted by means of the shaft 2 a revoluble spool or turning member B, said shaft being riveted or otherwise secured vertically upon the surface of said arm. The spool B has its body or sleeve 3 journaled upon said shaft, and its lower end 4 is in the form of a circular plate eccentrically disposed as regards the axis of said spool and shaft, while its upper end or head 5, which is also circular is concentrically disposed as regards said axis. The lower

end acts as a striking member, which is adapted to impinge or press against the releasing device for the brake to be hereinafter described. The time at which the striking member impinges is regulated or determined by the position assumed rotatably by the spool on its axis, it being obvious that due to the eccentricity of the striking member on its axis, the time at which the periphery of the striking member impinges can be predetermined. To hold the spool in adjusted position on its axis a retarding pawl 6 in the form of a spring arm is secured by a screw 7 or other suitable means in fixed position, the free end of said pawl being formed with a detent or tooth 8, which is adapted to engage with and play over the teeth 9, said teeth being arranged in series concentrically about the axis of the spool. The arm of the pawl being of spring material releasably engages by its detenture the teeth 9, permitting the spool to be turned by the upper end or head 5, but retarding the movement of the spool. The edge of the head is knurled at 10 to facilitate turning the spool by hand and the surface of said head is marked with a suitable scale or dial 11 over which a pointer 12 mounted rigidly upon the shaft 2 indicates the radial position assumed by the spool when the latter is turned on its supporting shaft. In this manner the position assumed by the eccentric striker or lower end 4 of the spool can be predetermined by said scale and pointer. The end of the supporting arm A opposite that on which the spool is mounted is formed with an opening 13, which is adapted to fit over a revoluble member such as the shaft 14 on a sound reproducing machine, said opening 13 being formed with flattened sides 15, which engage corresponding flattened surfaces 16 on the shaft 14, so that the arm A is swung by the turning movement of the shaft 14. The arm A may be provided with any suitable means for engagement with a movable part of any mechanism to which my invention is applicable for use.

For the purpose of illustrating the manner in which my invention can be used, I have shown the same applied to a conventional type of Edison sound reproducing machine C, illustrated in Fig. 3 of the drawing. In this type of machine, the sound amplifying horn 17 is mounted upon the vertical revoluble shaft 14 and the sound



box 18 is moved in synchronism with the turning movement of the record tablet 19 by means of a frame resembling a quadrant 20 mounted upon the shaft 14 and having teeth 21 which mesh with the teeth 22 of the threaded feed screw 23 of usual construction, which is revolved in the usual manner by the driving mechanism not illustrated in the machine. In this manner the shaft 14 is turned in synchronism with the movement of the sound box 18 in the usual manner, and my improved stop correspondingly swings about the axis of said shaft. The striker 4 of the spool is adapted to impinge against the freely extending arm 24 of the brake releasing member 25, the period when the striking member comes into contact with the arm 24 and causes said arm to release the brake being adjustably determined by the position assumed by the spool rotatably on the shaft 2. The brake releasing member which is of usual construction is pivotally mounted at 26 between its ends and the member 25 is formed with a tooth 27, which is adapted to engage in a notch 28 formed in the hub 29 of the brake. This hub is pivotally mounted at 30 and carries the hand operable brake setting arm 31 extending outwardly from below the turn table 32 of the machine, and said hub also has the usual brake shoe 34, which is adapted to press when the brake is released against the inner surface of the depending flange 35 on the turn table to stop the turn table from revolving. A helical spring 36 connected between the arms 25 and 31 releasably holds the tooth 27 engaged in the notch 28 of the hub 29. When these members are engaged as stated the brake is held out of contact with the flange 35 and the turn table revolves freely, but immediately upon the eccentric striker 4 impinging or pressing against the free end of the arm 24 the brake is released and the turn table stopped. In use the record tablets can be numbered according to the length of their record grooves, and the sizes of the tablets and the scale 11 numbered to correspond, so that when any record tablet is placed upon the turn table to be played, and the spool B turned upon its supporting shaft 2 until the number on the scale in registration with the pointer corresponds with the number on the record tablet, the striker element will cause the brake release to free the brake and stop the turn table as soon as the record has been played.

In the construction illustrated in Figs. 4 and 5, the equivalent of the spool element B illustrated in Fig. 1 is simplified, a single disk element or eccentric 40 being employed which is eccentrically and revolubly mounted upon the outer end of the supporting arm A by means of a screw 41. The pointer 42 and spring pawl 43 are also combined into one element, an arm 44 being shaped with

the pointer 42 on its outer end with the spring pawl 43 formed between its ends within an opening 45. The end of this arm opposite that on which the pointer 42 is formed is secured rigidly by a screw 46 to the main supporting arm A, while the end portion of the arm 44 on which the pointer 42 is formed is secured below the head of the screw 41, which revolubly fastens the eccentric 40 on the arm A. The eccentric 40 has impressed or otherwise marked upon its surface a dial or scale 47, concentric with the axis of said eccentric and within this dial is impressed or otherwise formed a concentric series of teeth 48. The pointer 42 coöperates with the dial and indicates in the same manner as in the construction illustrated in Figs. 1 and 2 the position assumed by the eccentric about its axis, while the spring pawl 43 is adapted to releasably engage with the teeth 48 to hold the eccentric in any adjusted position assumed. The outer edge 49 of the eccentric may be knurled to facilitate turning of the eccentric by hand in adjusting it in position about its axis. The end of the supporting member A opposite that on which the eccentric is mounted is formed with an opening 13 similar to that illustrated in Figs. 1 and 2 for mounting the supporting member on the shaft 14, but I contemplate providing any suitable means in place of the opening 13 for securing the supporting member on any suitable coöperating element with which my invention can be used for performing the function desired. I further contemplate changing the form and design of the various parts of my invention within the spirit thereof.

In accordance with the patent statutes, I have described the principles of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof, but I desire to have it understood that the construction shown is only illustrative, and that the invention can be carried out by other means and applied to uses other than those above set forth within the scope of the following claims.

Having described my invention, what I claim as new and desire to protect by Letters Patent is:

1. The combination in a sound reproducing machine having a traveling element, a turn table and brake mechanism to prevent the table revolving, of a base secured to said traveling element, an eccentric revolubly mounted upon said base and adapted for co-operation with said brake mechanism to effect the setting thereof, the position assumed by said eccentric about its axis predetermining when said brake and eccentric co-act together, means for retarding the revolving movement of said eccentric on said base, a scale disposed about the axis of said



eccentric and a pointer coöperating with said scale to indicate the relative position assumed by said eccentric about its axis.

2. The combination in a sound reproducing machine having a traveling element, a turn table and brake mechanism to prevent the table revolving, of a base removably secured to said traveling element, a spool having an eccentric lower end revolubly journaled on said base, the upper end of said spool forming a hand operable turning member, a retarder associated with said eccentric for holding the spool after it is turned into adjusted position, and a dial and pointer at the upper end of said spool for predetermining the adjustment of said eccentric.

3. The combination in a sound reproducing machine having a traveling element, a turn table and brake mechanism to prevent the table revolving, of a base support for attachment to said traveling element, a spool revoluble about its axis on said support, the

lower end of said spool being an eccentric and its upper end a hand operable turning member, means associated with said spool for holding the eccentric after it has been turned into adjusted position, and a dial and pointer associated with said spool for predetermining the adjustment of said eccentric.

4. The combination in a sound reproducing machine having a traveling element, a turn table and brake mechanism to prevent the table revolving, of a support secured to said traveling element, an eccentric revoluble about its axis on said support having a hand operable member thereon for turning said eccentric into adjusted position, a retarder for holding said eccentric after it has been turned into adjusted position, and a dial and pointer for predetermining the adjustment of said eccentric.

In testimony whereof, I have signed my name to this specification.

FRANCIS A. NOLAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



GRAMOPHONE AND THE  
LIKE,

#1,230,509-----N.Pemberton-Billing,  
Patented-June 19th, 1917.  
Filed-January 4th, 1917.

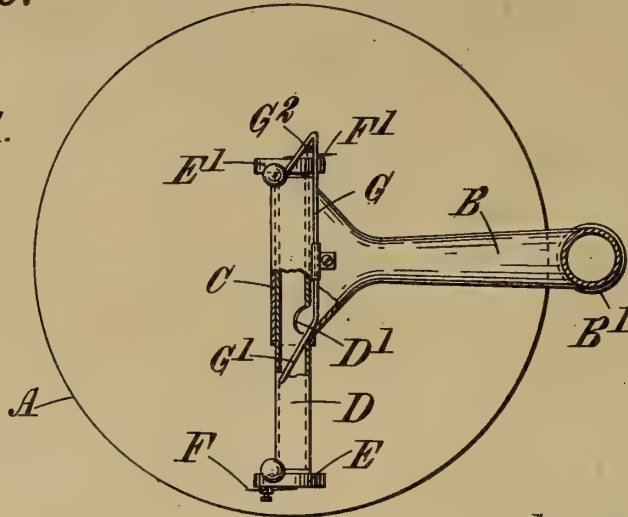


N. PEMBERTON-BILLING.  
GRAMOPHONE AND THE LIKE.  
APPLICATION FILED JAN. 4, 1917.

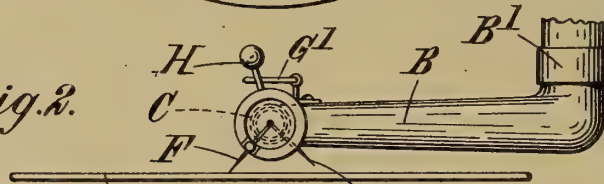
1,230,509.

Patented June 19, 1917.

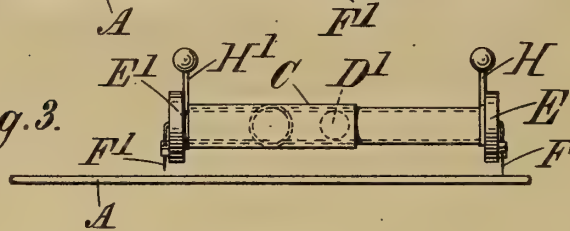
*Fig. 1.*



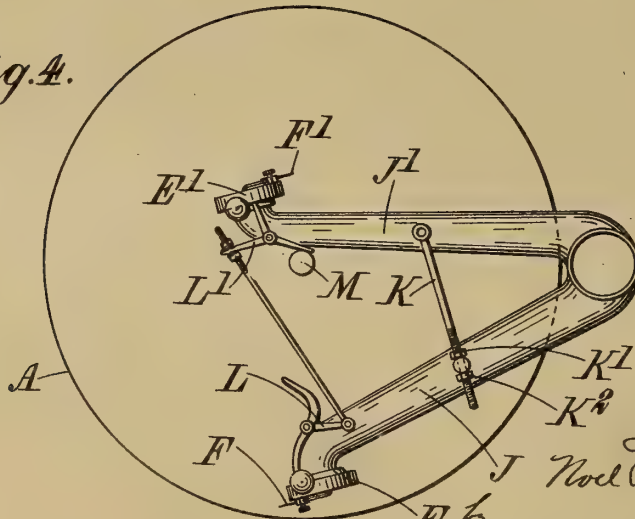
*Fig. 2.*



*Fig. 3.*



*Fig. 4.*



*Inventor*  
Noel Pemberton-Billing  
*Forster Freeman Nelson & Co.*

# UNITED STATES PATENT OFFICE.

NOEL PEMBERTON-BILLING, OF COUNTY OF HERTFORD, ENGLAND.

GRAMOPHONE AND THE LIKE.

1,230,509.

Specification of Letters Patent. Patented June 19, 1917.

Application filed January 4, 1917. Serial No. 140,639.

*To all whom it may concern:*

Be it known that I, NOEL PEMBERTON-BILLING, a subject of the King of England, residing in Hertfordshire, England, have  
5 invented certain new and useful Improvements in Gramophones and the like, of which the following is a specification.

This invention relates to improvements in gramophones or the like.

10 It is often desirable that a gramophone shall be capable, when occasion requires, of repeating the reproduction of the whole or a part of a record without necessitating re-adjustment of the reproducer by the op-  
15 erator, or stoppage of the motion of the record. The object of the present invention is to provide a simple repeating mechanism by which such repetition may be effected, preferably automatically.

20 According to this invention there are provided two reproducers to be used alternately, which are so linked together that as the operative reproducer of the pair moves across the record the idle one is carried back over  
25 the record to the starting point, combined with automatic or other means to render the idle reproducer operative and the operative one idle. Thus when the one reproducer has completed the reproduction of the record  
30 the other has been carried back to the starting point and when rendered operative immediately recommences the reproduction.

When flat records are employed on the gramophone, the two reproducers may be  
35 rigidly connected together; thus they may be linked together by a sound-tube which they have in common. In one construction this sound-tube may be mounted to slide endwise through a support by which it is  
40 connected to the horn, by which sliding mounting the movement of the reproducers across the record is permitted.

In order to enable the apparatus to suit various records, the reproducers should be  
45 adjustable as to their distance apart, to which end the sound-tube may be made telescopic.

In order to render one of the reproducers operative and the other idle, they may both  
50 be mounted on an angularly movable support, angular movement of which raises the record-engaging stylus of the operative reproducer from the record and simultane-

ously lowers the stylus of the idle reproducer into contact with the record and  
55 means (preferably automatic) may be provided to move the said member angularly when the reproducers reach the end of their travel in one direction or the other across the record.

In the accompanying drawings—

Figure 1 is a plan partly in section of such parts of the gramophone as are necessary to  
illustrate the present invention;

Fig. 2 is a side elevation of Fig. 1;

Fig. 3 is a front view of Fig. 1;

Fig. 4 is a plan of an alternative construction.

Like reference characters denote like parts throughout the drawings.

Referring first to the construction illustrated in Figs. 1, 2 and 3, a disk-record is indicated at A. A hollow arm B extends from the base B<sup>1</sup> of the horn toward the center of the record, this arm being similar  
75 to the usual swinging hollow arm upon which the reproducer is mounted. In this construction, however, the arm B is fixed and it is provided, at its outer end, with a transverse socket or tube C. The interior of  
80 this tube C is in communication with the interior of the tube B.

Within this socket there slides a sound-tube D, which carries a reproducer E E<sup>1</sup> at each end. An opening D<sup>1</sup> in the tube D  
85 permits the sound to pass from the tube D to the fixed arm B and thence to the horn. The disposition of the parts is such that the sound-tube D lies approximately on a diameter of the disk and it is made of such  
90 length that when one reproducer E is bearing on the record at its outer margin, the other reproducer E<sup>1</sup> is ready to bear on the record at its inner margin. In order to provide for the use of records of different sizes,  
95 the tube D may be made telescopic, a suitable clamp being provided to fix it after it has been adjusted to the required length.

The two needles F F<sup>1</sup> on the reproducers are inclined in opposite directions since they  
100 bear on the record on opposite sides of its center and they are arranged to be brought alternatively into contact with the record by giving the tube D, with the reproducers E E<sup>1</sup>, a slight rotative motion about the axis  
105 of the tube. Thus, in Fig. 2, a slight clock-



wise rotation of the tube D will lift the needle F from the record and bring the needle F<sup>1</sup> into contact with the record. Various means may be provided for effecting this rotation and one is illustrated by way of example. A rod G is fixed on the arm B and provided with arms G<sup>1</sup> G<sup>2</sup> extending over the tube D. At each end of the tube there is mounted a finger H H<sup>1</sup> which has a certain freedom of movement between two stops on the tube D. The disposition of these arms is such that when the tube D is moved across the disk to its limiting position, one of these arms comes into contact with the cooperating arm G<sup>1</sup> or G<sup>2</sup> and by further movement of the tube the arm H (or the arm H<sup>1</sup>) is swung across from one side of the vertical to the other. The arms H H<sup>1</sup> are weighted so that as soon as they are tilted past the vertical they fall, and by engaging one of the stops on the tube D, the latter is turned so as to reverse the needles in the manner above described. This weight also serves to insure that the needle is held in contact with the disk with the necessary pressure.

Various other devices may be used for effecting the change-over of the needles. Thus, for example, the disk may be carried on a special tray which has a cam formed on its edge, and a projection on each end of the sound-tube may be arranged to be engaged by this cam as it approaches the edge of the tray so as to rock the tube D and reproducers E E<sup>1</sup>.

A modified construction according to this invention is illustrated diagrammatically in Fig. 4. In this case the two reproducers E E<sup>1</sup>, instead of being mounted upon a common sound-tube, are each mounted on the end of separate sound-tubes J J<sup>1</sup>. Each of these tubes is in communication with the interior of the horn-support by a swivel joint so that each of them can swing across the record in the ordinary way. The two tubes are adjusted in a definite angular relationship with one another by an adjustable tie-rod K so that they can be set with the two needles F F<sup>1</sup> spaced relatively to the record in the manner described with relation to the previous construction. The tie-rod K may be pivotally connected to one tube J<sup>1</sup> and secured to the other tube J by two nuts K<sup>1</sup> K<sup>2</sup> engaging between them a lug on the tube J.

The two reproducers E E<sup>1</sup> are each mounted on the end of its sound-tube so as to be capable of slight rotation thereon so that the needles F F<sup>1</sup> can be alternately brought into operative contact with the record A. Any convenient mechanism may be used for effecting this shifting of the reproducers and one arrangement has been shown by way of example. Bell-crank levers L L<sup>1</sup> are mounted on the sound-tubes J J<sup>1</sup> and each

has an arm connected to its corresponding reproducer so that it can impart the necessary motion to it. The other arms of these levers are connected together by a tie-rod, which is adjustable in length so as to provide for adjustments of the rod K. When one reproducer is tilted to lift its needle off the record, the linkage provided transmits the motion to the other reproducer so as to bring its needle into contact with the record. The necessary movement is imparted to the system by providing a third arm on each of the bell-crank levers and a central pin or lug M which is so positioned that when a reproducer has traveled across the record to the desired extent, the extra arm on one of the bell-crank levers engages with this pin M. Various other forms of mechanism, however, may be used for effecting the necessary simultaneous movement of the needles.

The special advantage of this arrangement is that each reproducer is directly connected to the horn and the sound-reproduction is improved as there are no pockets in the sound-passage which tend to localize the sound instead of transmitting it to the horn.

It is to be understood that the precise details of construction which have hereinbefore been set forth are given by way of example of the application of this invention, and the invention is not limited to these details except as set forth in the appended claims.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In a repeating mechanism for a gramophone the combination of a sound-tube, a supporting member set diametrically to the record wherein said tube is free to slide longitudinally, two reproducers mounted one at each end of said tube and angularly displaced from one another about the longitudinal axis of the tube, said reproducers being spaced apart such a distance that when one is opposite the inner margin of the record the other is opposite the outer margin thereof, a pin projecting upwardly from each reproducer, two wedge-shaped members secured on said supporting member in such position as to engage respectively one of said pins at the end of the travel of the tube and rock the tube and reproducers about the longitudinal axis of the tube to render one reproducer operative and the other inoperative.

2. In a repeating mechanism for a gramophone the combination of a telescopic sound-tube, a supporting member set diametrically to the record wherein said tube is free to slide longitudinally, two reproducers mounted one at each end of said tube and angularly displaced from one another about the longitudinal axis of the tube, said reproducers being spaced apart such a distance that when one is opposite the inner margin



of the record the other is opposite the outer margin thereof, a pin projecting upwardly from each reproducer, two wedge-shaped members secured on said supporting member  
5 in such position as to engage respectively one of said pins at the end of the travel of the tube and rock the tube and reproducers

about the longitudinal axis of the tube to render one reproducer operative and the other inoperative.

In testimony whereof I have signed my name to this specification.

10

NOEL PEMBERTON-BILLING.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



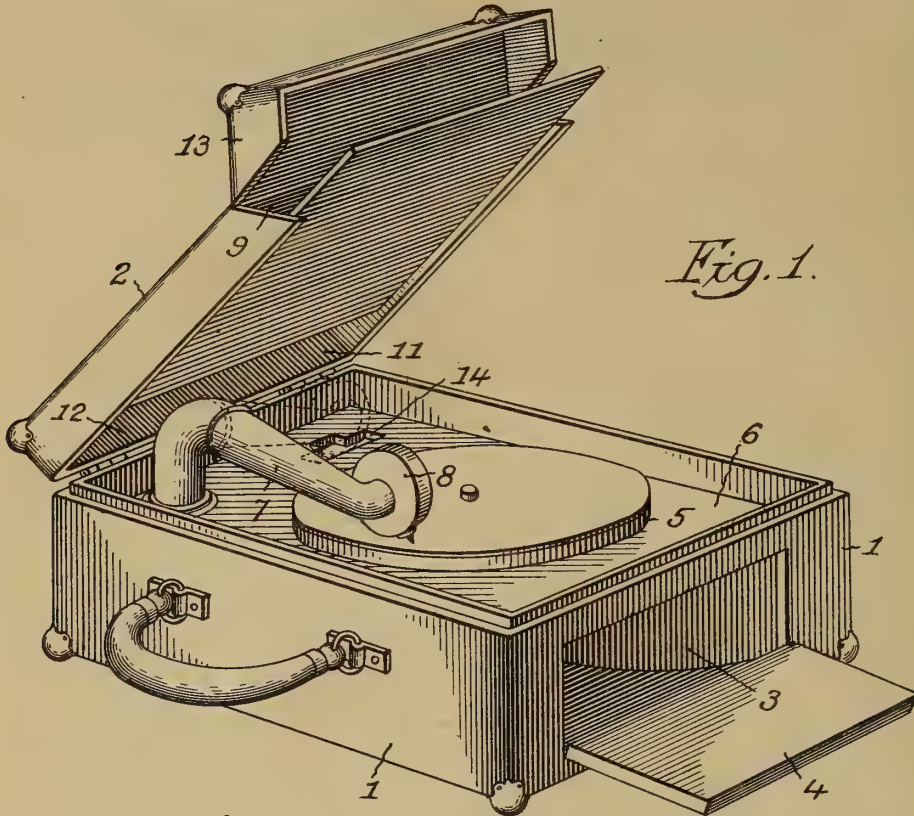
PROTABLE TALKING MACHINE,  
#1,230,614-----A. Stechbart,  
Patented-June 19th, 1917.  
Filed- September 10th, 1916.



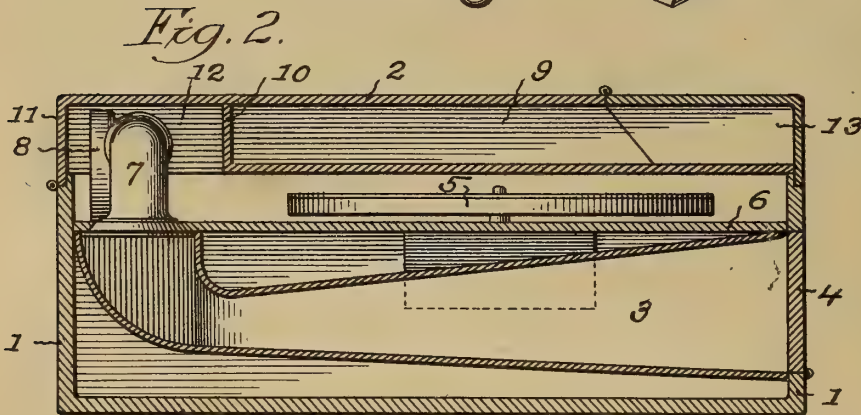
A. STECHBART.  
 PORTABLE TALKING MACHINE.  
 APPLICATION FILED SEPT. 18, 1916.

1,230,614.

Patented June 19, 1917.



*Fig. 1.*



*Fig. 2.*

Witness:  
*John Enders*

Inventor:  
*Arthur Stechbart,*  
 by *Robert Burns,*  
 Attorney

# UNITED STATES PATENT OFFICE.

ARTHUR STECHBART, OF CHICAGO, ILLINOIS.

## PORTABLE TALKING-MACHINE.

1,230,614.

Specification of Letters Patent.

Patented June 19, 1917.

Application filed September 18, 1916. Serial No. 120,596.

*To all whom it may concern:*

Be it known that I, ARTHUR STECHBART, a subject of the Empire of Russia, and a resident of Chicago, in the county of Cook, State of Illinois, have invented certain new and useful Improvements in Portable Talking-Machines, of which the following is a specification.

This invention relates to a compact formation and association of the component parts of a talking machine adapted to be folded together into a compact and convenient form for transportation from place to place. And the present improvement has for its object to provide a structural formation and association of parts whereby the talking machine may be compactly folded together, and with which provision is made for the convenient storage of a stock of sound records, all as will hereinafter more fully appear.

In the accompanying drawing:

Figure 1, is a perspective view of a talking machine embodying the present invention, with the parts shown in an open and active position, and with the sound box arm shown in an inactive position in dotted lines.

Fig. 2, is a longitudinal sectional elevation of the same, with the parts in a closed and inactive position.

Similar reference numerals indicate like parts in both views.

Referring to the drawing, 1 designates the body portion, and 2 the hinged cover portion of the inclosing casing of a talking machine of the disk-record type, the parts being finished and trimmed to resemble a traveling suit case or the like. The body portion 1 is preferably of a rectangular box form and houses the motor mechanism as well as the fixed forwardly extending sound amplifying conveyer or horn 3 of the machine. The outlet end of said conveyer or horn 3 is associated with a sound regulating door 4 or like provision in the front wall of the body portion 1 of the machine casing.

5 designates the record carrier, mounted to rotate above the top web or closure 6 of the body portion 1 of the machine casing, and adapted to receive rotation from a suitable motor arranged in said body portion 1.

7 designates the horizontally swinging tone or sound box arm, pivotally associated with the inner end of the conveyer or horn

3 aforesaid, and carrying at its free end the sound box or reproducer 8, as shown.

The construction and arrangement of parts so far described are common to talking machines now in general use, and may be of any ordinary and usual type, the material part of the present invention comprising in connection therewith features as follows:—

9 designates a sound-record storage chamber formed on the under side of the hinged cover 2 of the machine casing, with its rear wall 10 disposed a distance in front of the rear wall 11 of said cover to provide an open bottom space or chamber 12, to receive the sound box arm 7 aforesaid, when the same is in its inactive position as illustrated in full lines in Fig. 2 and in dotted lines in Fig. 1.

13 designates a lid or door of the drop-type, hinged at the open front end of the storage chamber 9 aforesaid, and adapted to afford convenient access through the open front of said chamber to the sound records stored therein, and to close said chamber and protect the sound records when the machine is closed for storage, transportation, etc.

14 designates a recess formed in the top board or web 6 of the machine casing, and adapted to receive the lower portion of reproducer 8 and its needle and needle carrier, when the machine is in its closed condition, to hold said parts in place, and at the same time decrease the height required in the chamber 12 aforesaid, as illustrated in Fig. 2.

Having thus fully described my said invention, what I claim as new and desire to secure by Letters Patent, is:—

1. A casing comprising, a rectangular box shaped body member having a sunken partition providing an open top chamber for the record carrier of a talking machine, a cover member hinged at its rear end to said body member and divided by an L shape partition into a forward storage chamber and a rearward open bottom chamber adapted to receive the reproducer and tone arm of talking machine after the same has been swung back into an inoperative position.

2. A casing comprising, a rectangular box shaped body member having a sunken partition providing an open top chamber for the record carrier of a talking machine, a



cover member hinged at its rear end to said  
body member and divided by an L shape  
partition into a forward storage chamber  
and a rearward open bottom chamber adapt-  
5 ed to receive the reproducer and tone arm of  
talking machine after the same has been  
swung back into an inoperative position,

the aforesaid sunken partition having a re-  
cess for the reception of the lower portion  
of said reproducer.

Signed at Chicago, Illinois, this 15th day  
of September, 1916.

10

ARTHUR STECHBART.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."

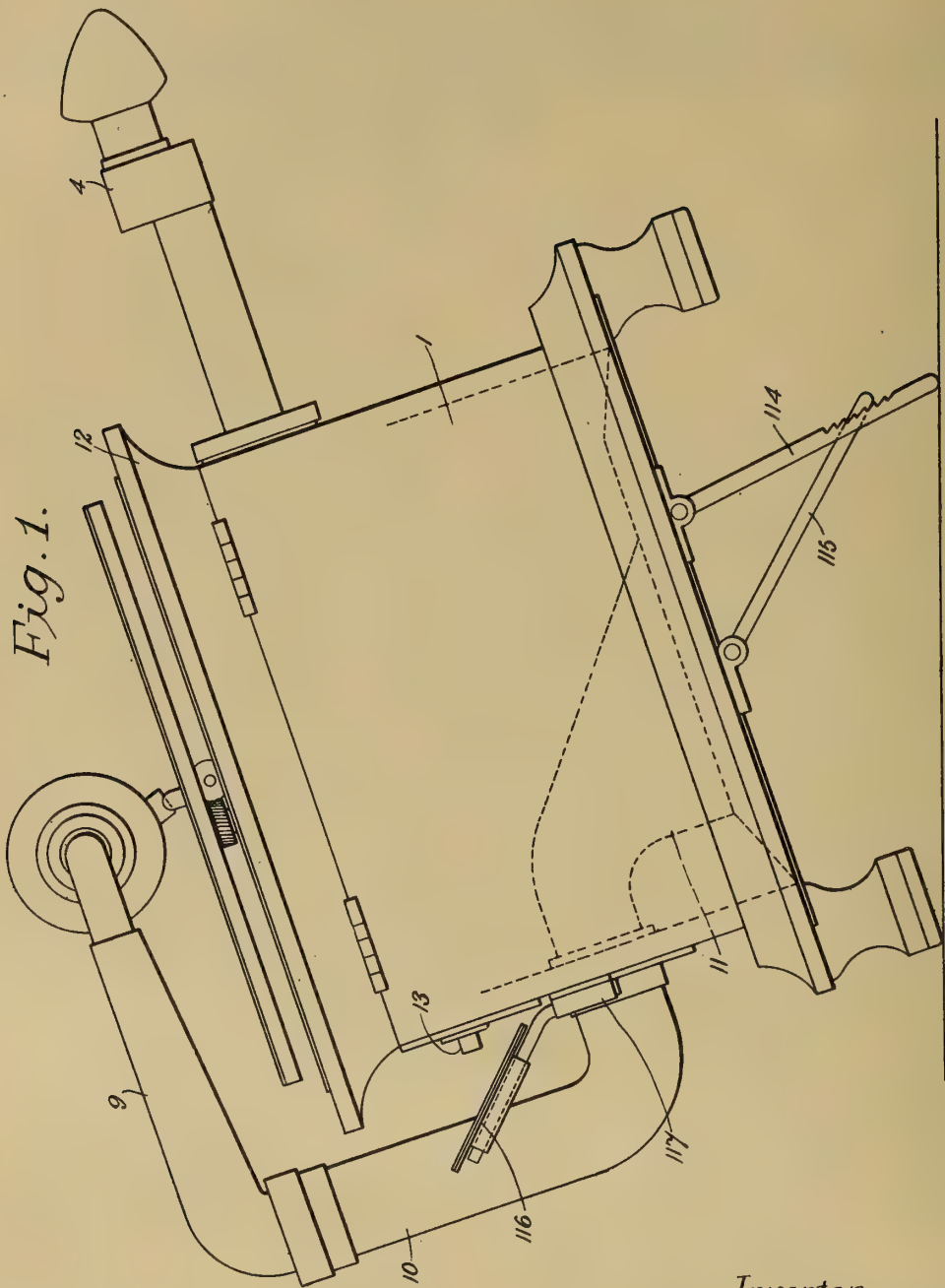


CINEMATOGRAPH AND GRAMOPHONE MACHINE,  
 #1,230,633-----F. Von Madaler,  
 Patented -- June 19th, 1917.  
 Filed-June 22nd, 1915.

F. VON MADALER.  
CINEMATOGRAPH AND GRAMOPHONE MACHINE.  
APPLICATION FILED JUNE 22, 1915.

1,230,633.

Patented June 19, 1917.  
5 SHEETS—SHEET 1.



Inventor:  
*Ferdinand von Madaler,*  
*by Wilkinson, Gustaf & Neckage,*  
*Attys.*





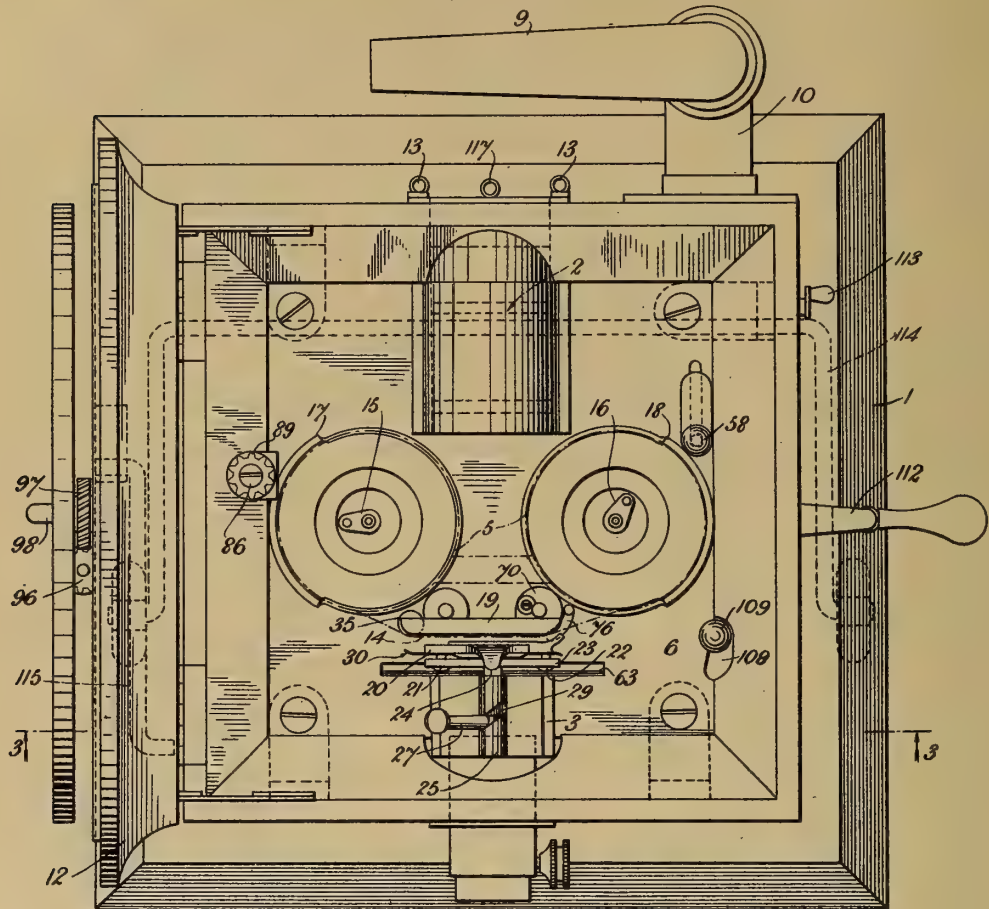
F. VON MADALER.  
CINEMATOGRAPH AND GRAMOPHONE MACHINE.  
APPLICATION FILED JUNE 22, 1915.

1,230,633.

Patented June 19, 1917.

5 SHEETS—SHEET 2.

Fig. 2.





F. VON MADALER.  
CINEMATOGRAPH AND GRAMOPHONE MACHINE.  
APPLICATION FILED JUNE 22, 1915.

1,230,633.

Patented June 19, 1917.

5 SHEETS—SHEET 3.

Fig. 3.

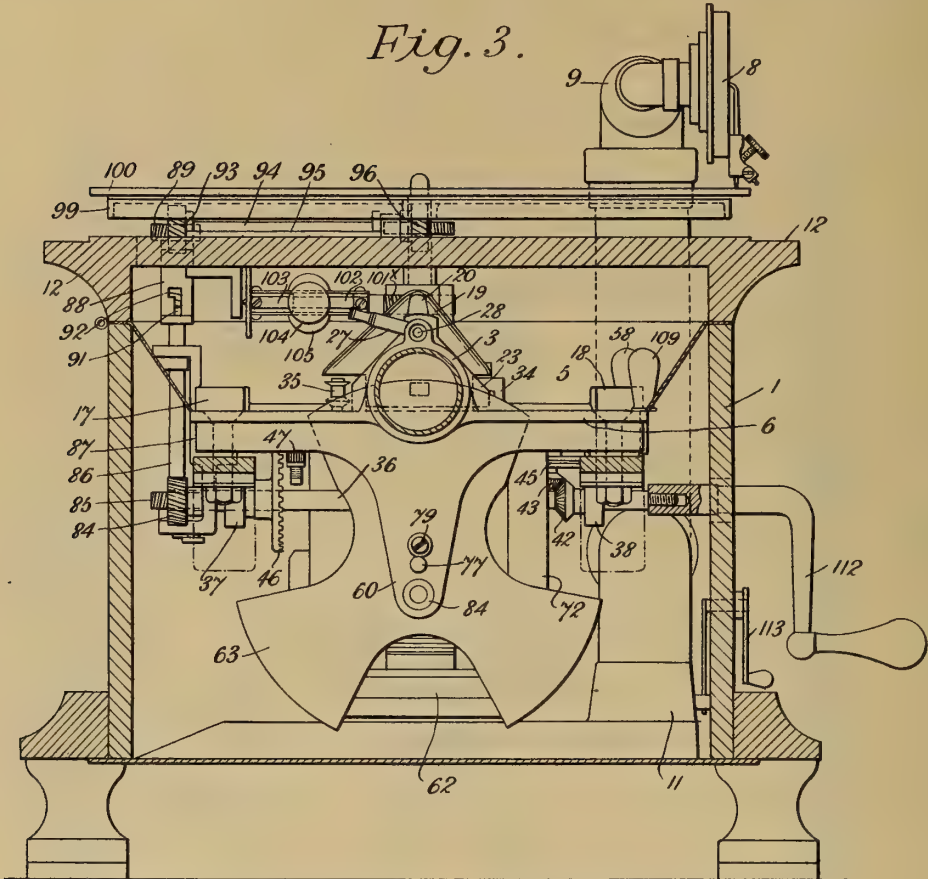
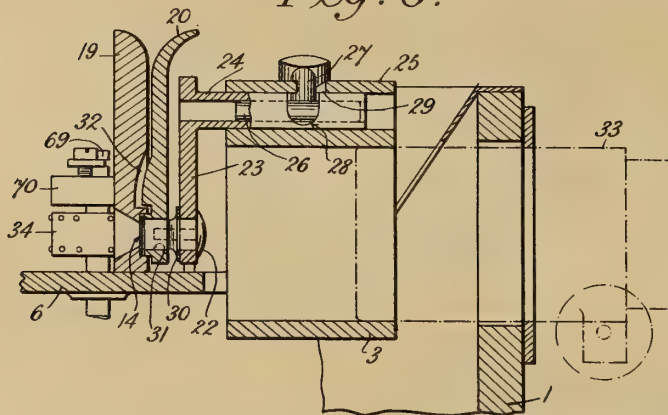


Fig. 6.



Inventor:  
Ferdinand von Madaler,  
by Wilkinson, Gustaf & Mackay,  
Attys.





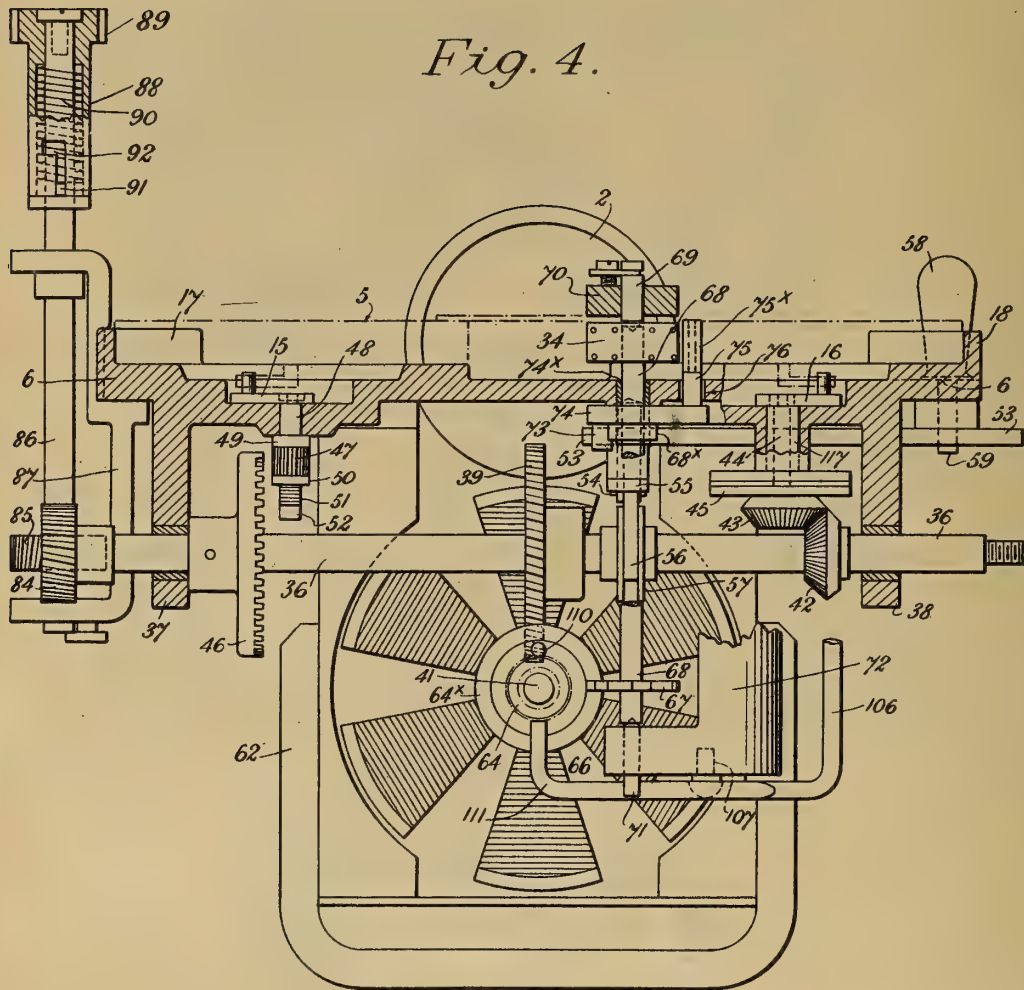
F. VON MADALER.  
CINEMATOGRAPH AND GRAMOPHONE MACHINE.  
APPLICATION FILED JUNE 22, 1915.

1,230,633.

Patented June 19, 1917.

5 SHEETS—SHEET 4.

Fig. 4.



Inventor.  
Ferdinand von Madaler,  
by Wilkinson, Gustav & Mackay,  
Attys.





F. VON MADALER.  
CINEMATOGRAPH AND GRAMOPHONE MACHINE.  
APPLICATION FILED JUNE 22, 1915.

1,230,633.

Patented June 19, 1917.

5 SHEETS—SHEET 5.

Fig. 5

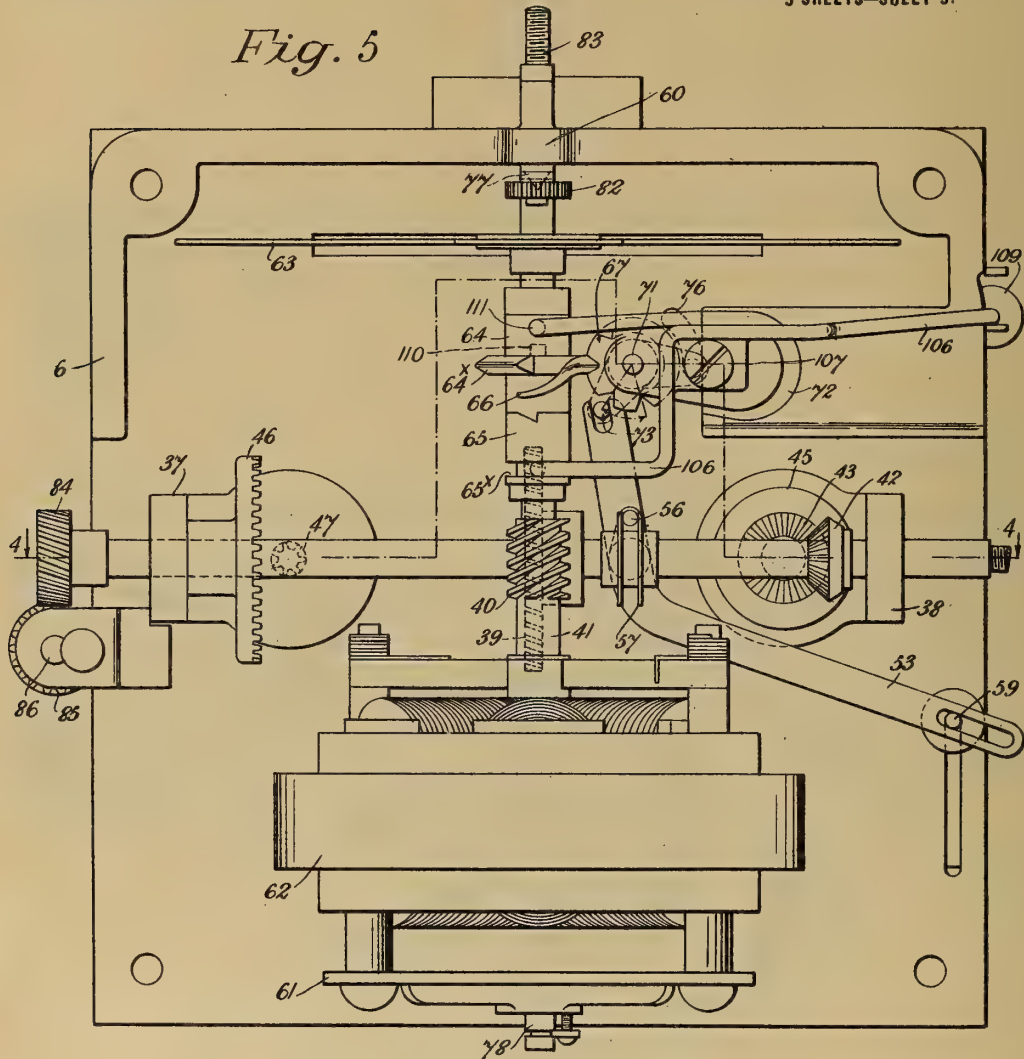


Fig. 7.

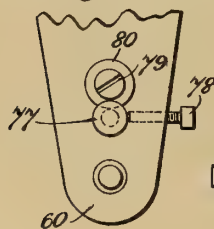


Fig. 8.

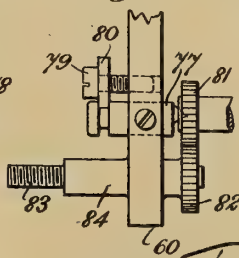
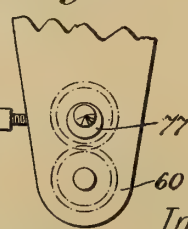


Fig. 9.



Inventor:  
Ferdinand von Madaler,  
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# UNITED STATES PATENT OFFICE.

FERDINAND VON MADALER, OF NEW YORK, N. Y., ASSIGNOR TO THE ROTARY PHOTOGRAPHIC CO. LTD., OF WEST DRAYTON, ENGLAND, A CORPORATION OF GREAT BRITAIN AND IRELAND.

## CINEMATOGRAPH AND GRAMOPHONE MACHINE.

1,230,633.

Specification of Letters Patent. Patented June 19, 1917.

Application filed June 22, 1915. Serial No. 35,637.

*To all whom it may concern:*

Be it known that I, FERDINAND VON MADALER, a subject of the Austrian Emperor, and a resident of New York, in the State of New York, United States of America, have invented a certain new and useful Improvement in Cinematograph and Gramophone Machines, of which the following is a specification.

This invention relates to improvements in cinematograph and gramophone machines, that is to say to apparatus, of the type described in my prior Patent No. 1,139,241 of May 11, 1915, for taking, viewing or projecting a succession of pictures upon a traveling film or paper strip, hereinafter referred to as a film, the machine being used to view or project the pictures on the film in a manner to represent a moving subject, or as a series of varied and stationary subjects, the machine being also provided with mechanism for enabling it to be used as a gramophone the arrangement being such that either device may be used independently of the other or the two may be used together the two parts working in synchronism if a gramophone disk or record synchronized with the picture has been provided for the purpose.

The principal object of the invention is to combine a cinematograph and gramophone apparatus in such a manner that the combined mechanism is simple and capable of being easily and quickly disconnected so that either device may as stated be used alone if desired, certain parts of the mechanism being employed for driving both devices.

It will be understood that in using in this specification and claims the term "cinematograph" a viewing apparatus as well as a projecting apparatus is included, while in the term "gramophone" is included other forms of talking apparatus such as those of the cylinder type.

Further objects of the invention are the simplification and improvement of certain of the details of construction all of which will hereafter be more fully described.

The invention will now be described with reference to an embodiment thereof illustrated by way of example in the accompanying drawings in which:—

Figure 1 is a side elevation showing the

machine in a position for viewing the pictures within the machine by means of an attachment comprising focusing tubes and eye pieces.

Fig. 2 is a plan of the machine with the cover or top thrown back.

Fig. 3 is a sectional elevation on line 3—3 of Fig. 2.

Fig. 4 is a sectional elevation on line 4—4 of Fig. 5 of the operative mechanism, removed from the casing, drawn to an enlarged scale.

Fig. 5 is an underneath plan of the operative mechanism, removed from the casing, drawn to the same scale as Fig. 4.

Fig. 6 is a longitudinal section of the gate mechanism, drawn to an enlarged scale.

Figs. 7, 8 and 9, are front, side and back elevations respectively, drawn to an enlarged scale, of the means for adjusting the shaft upon which the shutter is mounted, and for driving said shaft directly, and

Fig. 10 is a plan of a part of the top of the casing illustrating the connection between the driving mechanism and the gramophone disk plate.

In the drawings, 1 represents the outer box or casing, 2 a condenser, 3 the lens holder, 4 the focusing tubes and eye pieces, which may be of the known prismatic or binocular form, for viewing the pictures within the machine, 5 the film box, 6 the table or framework supporting, on its upper side, the condenser 2, film box 5 and gate mechanism 7, and, on its underside the driving mechanism which will be hereinafter more fully described, 8 the reproducer of the gramophone, 9 the movable arm or tube supporting said reproducer, 10 the fixed support for such arm leading to the trumpet or resonator 11 situated in and forming the bottom of the box.

The box or casing 1, which may be of any desired kind, is furnished with a hinged lid 12, to which the mechanism for driving the gramophone is attached.

The lamp may be of any desired form, such for example as a Nernst lamp, and is adapted to be attached to the outside of the casing 1 by means of parts engaging with the sockets 13, or a reflector disk 116 supported in a socket 117, may be used in place of a lamp when viewing the pictures with the attachment 4.



The film box 5 which is preferably of the form described in Patent No. 1,100,591, dated June 16, 1914, is adapted to accommodate two spools on which the film 14 is wound, the spools are provided with cranked spindles adapted to be engaged by cranks 15, 16, forming part of the driving mechanism, the film box, when in position rests between the flanged parts 17, 18, formed on the table 6.

As described in the aforesaid specification the film box has a passage midway between the two spool boxes to enable light from the lamp or other source to pass through to the film, further description of this feature is however unnecessary.

The gate mechanism 7, through which the film 14 passes, is illustrated on an enlarged scale in Fig. 6, and comprises a fixed vertical plate 19 provided with rounded edges and tapers toward its upper end, a recess of the same width as the film 14 being provided in the lower part of said plate. Co-operating with the plate 19 is a movable plate 20 supported on two studs 21, 22, (Fig. 2) slidably mounted in a plate 23 carried by a tubular part 24, slidably arranged in an extension 25 formed on the lens holder 3. The part 24 is provided with a bolt 26 furnished with a finger 27 which passes through a slot 28 formed in the tubular part 24 at right angles to its axis, so that the bolt 26 has only a limited rotary movement within the part 24. In order to impart a slight longitudinal movement to the part 24 and thereby to the plate 23, an angular slot 29 is formed in the extension 25. For the purpose of providing resilient pressure between the parts 20 and 23, a leaf spring 30 is supported on the studs 21 and 22 between the parts named. To place the film in position the finger 27 is moved into the position shown in Figs. 2 and 3, the film is placed between plates 19 and 20 and, to prevent the film from catching against the projection 31 on the plate 20 which is adapted to enter the recess in the plate 19, the plate 20 is provided with a rounded projection 32 the plate 19 being correspondingly recessed to receive said projection. When the film is in position the finger 27 is turned over to the right, the plate 20 is thereby moved toward the film whereby the latter is held without undue pressure in the recess provided therefor, the pressure being equal throughout the width of the gate. The plates 19, 20 and 23 and the leaf spring 30 are all furnished with rectangular apertures of the size of the picture through which the light rays pass to the lens 33 or to the attachment 4.

The film is drawn through the gate by the pin sprocket wheel 34, the pins on which engage with recesses formed in the edges

of the film, a roller 35 being provided at the other or left side of the gate for guiding the film from the left hand spool into the gate.

The driving mechanism located below and supported by the table 6 comprises a shaft 36 supported on lugs 37 and 38 depending from the table 6 on which shaft is fixed a worm wheel 39 gearing with a worm 40 on a shaft 41 arranged below, and at right angles to, the shaft 36. The shaft 36 is provided with a bevel wheel 42 engaging with a bevel wheel 43 mounted on the lower end of a vertically disposed spindle 44 which spindle also carries one part of a frictional coupling 45 the co-acting part being carried by a sleeve 117 surrounding the spindle 44, upon the upper end of which sleeve the crank 16 is mounted. This crank serves to wind the film on the right hand spool while the picture is being viewed or projected, the frictional coupling 45 prevents the film from being wound too tightly on itself and possible breakage for, when the film is fully wound the crank 16 remains at rest notwithstanding the continued movement of the driving mechanism.

A crown wheel 46, mounted on the shaft 36, is adapted to engage with a pinion 47 mounted on a vertically disposed spindle 48 upon the upper end of which the crank 15 is fixed. When the shaft 36 is moved longitudinally in the direction of the arrow (Fig. 4), in the manner hereinafter described, the crown wheel is brought into engagement with the pinion 47 and rotates the crank 15 in the reverse direction to that of the crank 16 thereby winding the film on the left hand spool. In order to prevent the film from being torn from the spool on the right when it is being rewound on the left which might take place owing to the speed at which the crank 15 is rotated and also to prevent undue tightening of the film upon itself, the pinion 47 is not fixed on the spindle 48 but is loosely mounted thereon and frictionally held between two collars 49 and 50, the former being fixed to the spindle and the latter slidable thereon, by means of a spring 51, placed between the collar 50 and an enlarged end 52 formed on the spindle. By this means when the film 14 is fully rewound on the left hand spool and the mechanism is still in motion, the pinion 47 will slip freely on the spindle 48.

The shaft 36 is moved longitudinally by means of a reversing arm 53 pivoted on the pin 54 depending from the underside of the table 6. The arm 53 at its pivotal point carries a crank arm 55 upon the outer end of which is fixed, a pin 56 which engages with a collar 57 fixed on the shaft 36. When the arm 53 is moved in the direction of the arrow, Fig. 5, by means of the knob 58, the spindle 59 of which passes through the table



6 and engages with the slotted end of the arm 53, the spindle 36 is caused to slide longitudinally and thus remove the bevel wheels 42, 43, out of mesh and bring the crown wheel 46 into mesh with the pinion 47 for the purpose above described.

The shaft 41 is supported at one end on a lug 60 formed on the table 6, and at the other on a framework 61 secured to the framework of a motor 62. A shutter 63 is fixed on the shaft 41 and said shaft also carries two clutch elements 64, 65, the element 64 is mounted freely on the shaft and is provided with a disk part 64\*, while the element 65 is slidably arranged on but rotates with said shaft and is provided with an annular recess 65\*.

The disk part 64\*, which is formed with a beveled periphery, is furnished with a cam tooth 66 arranged to engage with a tooth or star wheel 67 on the spindle 68 upon the outer end of which is mounted, the sprocket wheel 34 for drawing the film through the gate 7. The spindle is supported at its upper end on an adjustable pivot pin 69 fixed in a lug 70 formed on the plate 19 of the gate 7 and at its lower end on a fixed pivot pin 71 fixed in a part 72 depending from the underside of the table 6.

The cam tooth 66 turns the sprocket wheel 34 through an angle sufficient to change the picture at each complete revolution of the shaft 41.

When it is desired to rewind the film on the left hand spool it is first necessary to open the gate 7 and to release and hold the film away from the sprocket wheel 34, this latter being effected by means of the reversing arm 53 the extreme inner end of which is slotted and engages with a downwardly projecting pin 73 carried by a crank arm 74 loosely mounted on a sleeve 74\* attached to table 6 and is held thereon by the collar 68\*. A vertically disposed pin 75, carrying a roller 75\*, is mounted on the other end of the crank arm 74, said pin projecting through a slot 76 formed in the table 6. When the arm 53 is moved in the direction of the arrow (Fig. 5) the pin 75 moves toward the gate 7 and releases the film from the pins on the sprocket wheel 34. With the parts in this position the film may be rewound on the left hand spool.

In order to provide means for taking up wear on the disk part 64, the shaft 41 is mounted on pivot pins 77, 78, adjustably mounted in the lug 60 and framework 61 of motor 62 the mounting of the pivot pin 77 being shown more clearly on an enlarged scale in Figs. 7, 8 and 9. As shown, the pin 77 is provided with an eccentrically disposed pivot point, the pin being maintained in the desired position by a set screw 78 and also by a set screw 79 carrying a washer 80 engaging with a recess in the pin 77. The

disk part and cam tooth being furnished with a beveled periphery are able to enter farther into the toothed wheel 67 as the distance between their respective shafts is decreased.

For the purpose of providing means for enabling single pictures to be viewed, the shaft 41 is furnished with a gear wheel 81 adapted to mesh with a wheel 82 carried by a spindle 83 mounted in a sleeve 84 provided on the lug 60, the outer end of such spindle being formed with a square or screw threaded as shown to receive a crank handle. The casing 1 may be provided if desired with a mark to indicate one turn of the handle, for the purpose of indicating when a picture has been brought into register with the viewing aperture.

The gramophone mechanism is operated by and connected to the cinematograph mechanism above described in the following manner:

A worm wheel 84 is mounted on the shaft 36 and meshes with a worm wheel 85 mounted on a spindle 86 supported by a bracket 87 secured to the table 6. The upper end of the spindle 86 passes through the aperture provided in the cover 12 and carries a sleeve 88 furnished at its upper end with a worm wheel 89. The sleeve 88 is maintained in its highest position on the spindle 86 by means of a spring 90 located within the sleeve and bearing on said sleeve at one end and on a pin 91 passed through the spindle 86 at the other, the sleeve being furnished with a bayonet slot 92 in which said pin slides for the purpose hereafter referred to.

The worm wheel 89 meshes with a worm wheel 93 mounted on a horizontally arranged spindle 94, supported in a double bearing 95, secured to the outside of the cover 12, as shown on an enlarged scale in Fig. 10. The spindle 94 carries at its other end a worm wheel 96 which is adapted to engage with a worm wheel 97 mounted on a vertically disposed spindle 98 upon which the supporting plate 99 for the record disk 100 is mounted. The worm wheels 89 and 93 being arranged at right angles to each other permits the gears to disengage easily when the cover is raised.

The spindle 98 is provided with any desired form of governing means, that shown being of known form and comprises a worm wheel 101 mounted on the inner end of the spindle 98 and meshes with a worm 101\* formed on a horizontally disposed spindle 102 upon which the sliding sleeve 103, to which one end of each of the springs 104 carrying the weights 105 are secured, the other end of each spring being fixed to the spindle 102.

When it is desired to operate the gramophone in combination with the cinemato-

graph the parts of the mechanism occupy the position shown in Figs. 2, 3, 4 and 5, but should it be desired to operate the cinematograph part alone the sliding sleeve 88 is pushed down on the spindle 86 and given a slight turn so as to cause the pin 91 to engage with the horizontally disposed portion of the bayonet slot 92 in said sleeve, by this means the worm wheels 89 and 93 are thrown out of engagement.

Should it be desired to operate the gramophone part alone it is preferable in order to eliminate the noise emanating from the film driving mechanism, caused by the engagement of the cam element with the toothed wheel, to throw such mechanism out of gear, and, to effect this the clutch element 65 is slidably moved on the shaft 41 so as to disengage said element from its co-acting part 64, and the means for effecting this comprises the bent arm 106 pivoted at 107 on the part 72, the inner end of such arm engaging with the annular recess 65\* formed in the clutch element 65, the outer end passing through an aperture 108 in the table 6 and terminating in a knob 109.

In order to prevent any rotation of the clutch element 64 while the clutch element 65 is disengaged therefrom, said element is provided with a pin 110 which is adapted to engage with an arm 111 fixed on and moving with the arm 106.

The mechanism may be driven by means of a handle 112 mounted on the end of the shaft 36, which may be square or screw threaded as shown, or it may be driven by the motor 62 connected up to a suitable source of current supply which may be cut in or out by a switch 113 (Fig. 3).

When it is desired to view the picture by means of the attachment 4 the entire box is preferably tilted up by means of the frame

114 held at the desired angle by means of the arm 115.

For taking pictures, that is negatives, the apparatus is necessarily provided with an appropriate lens and means for closing the light aperture at the rear and otherwise rendering the box light tight.

In using the terms "cinematograph" and "gramophone" in the following claims the readily recognizable or essential features of such apparatus are intended, and not the driving mechanism of each apparatus as a whole.

What I therefore claim is:—

1. In a cinematograph, the combination with a box a lid for said box, driving mechanism for said cinematograph contained within said box and including a worm wheel, a gramophone carried by said box and lid, and mechanism for operating same including a worm wheel, the worm wheel of the cinematograph and that of the gramophone being arranged at right angles to each other so that they may connect and disconnect as the lid is closed or opened.

2. In a cinematograph the combination of a box, a lid for said box, a driving mechanism for said cinematograph contained within said box and including a worm wheel, a gramophone carried by said box and lid mechanism for operating same including a worm wheel, the worm wheel of the cinematograph and that of the gramophone being arranged at right angles to each other so that they may connect and disconnect as the lid is closed and opened and means for disconnecting one of the worm wheels from its driving mechanism when the lid is closed.

In witness whereof I have hereunto set my hand.

FERDINAND VON MADALER.



SOUND REPRODUCER,  
#1,230,676-----J.J.Comer,

Patented-June 19th, 1917.  
Filed-July 24th, 1914.



J. J. COMER.  
SOUND REPRODUCER.  
APPLICATION FILED JULY 24, 1914.

1,230,676.

Patented June 19, 1917.

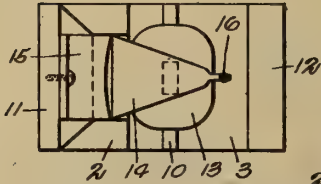


Fig. 2.

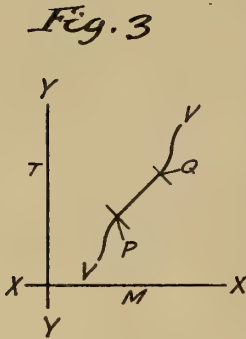


Fig. 3.

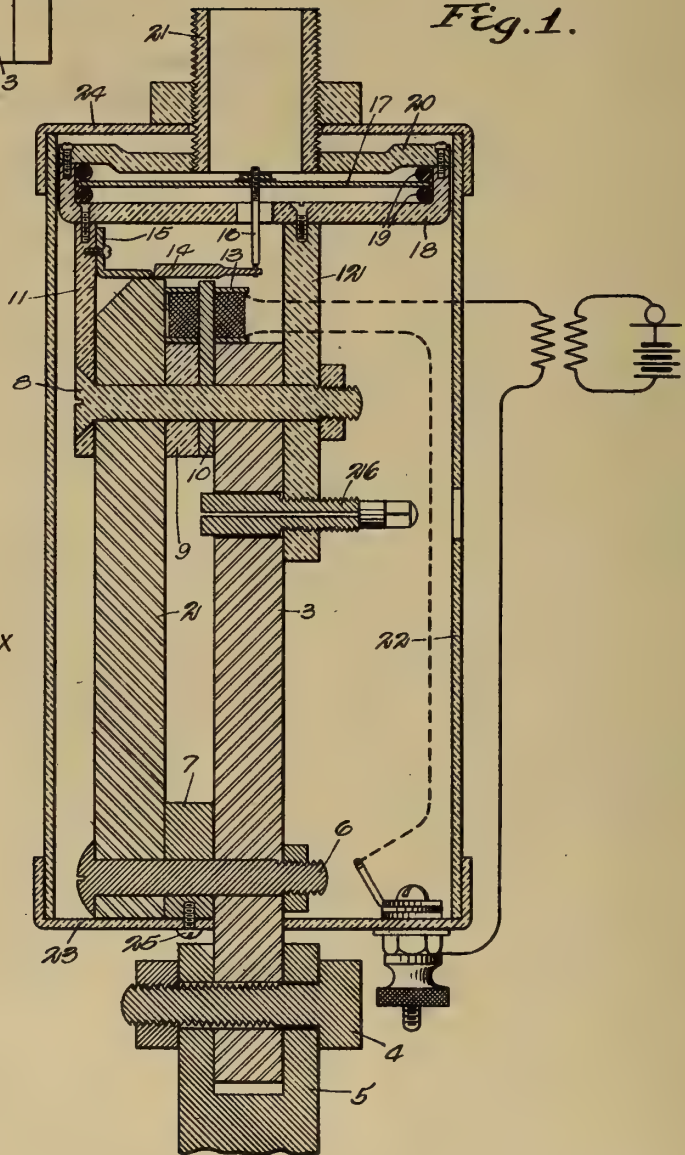


Fig. 1.

WITNESSES  
Chas. M. Candy.  
Geo. A. Janochowski.

INVENTOR  
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ATTORNEY

# UNITED STATES PATENT OFFICE.

JOHN J. COMER, OF CHICAGO, ILLINOIS, ASSIGNOR TO AUTOMATIC ENUNCIATOR COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

## SOUND-REPRODUCER.

1,230,676.

Specification of Letters Patent.

Patented June 19, 1917.

Application filed July 24, 1914. Serial No. 852,962.

*To all whom it may concern:*

Be it known that I, JOHN J. COMER, a citizen of the United States of America, and resident of Chicago, Cook county, Illinois, have invented a certain new and useful Improvement in Sound-Reproducers, of which the following is a specification.

My invention relates to sound reproducers and more particularly to those of the electromagnetic type and is therefore particularly adapted for use in connection with telephonic or loud speaking circuits. More particularly the object of my invention is to produce an instrument of the above character which is easily and effectively adjusted, as for example, by short circuiting the magnetic circuit of the controlling magnet.

Among the objects of my invention are:

To provide a cheaper and more simple and also more efficient instrument of the above character than heretofore.

To provide in such an instrument a more delicate and efficient means of adjustment.

It is also an object to provide certain details of improvement for the purpose of increasing the efficiency and serviceability of an instrument of the above character.

The means for accomplishing the foregoing and other useful ends are hereinafter set forth and claimed.

Referring to the accompanying drawing Figure 1 shows a sectional elevation of the instrument through the middle along a plane at right angles to the limbs of the magnet. Fig. 2 is a detail top view showing the knife edge of the vibrating armature. Fig. 3 is a curve showing the relation of forces.

Said magnet has two steel limbs 2 and 3, the latter extending below the former and provided at its lower extension with an opening for securing the instrument, as for example by a bolt 4, to anything suitable, as to the holder 5 for example. These two limbs are bolted together near the lower end by a bolt 6, clamping between the limbs a piece of soft iron 7 of suitable thickness to keep them apart a proper distance. Near their upper end they are bolted together by a brass bolt 8, clamping between the limbs a brass piece 9 and a soft iron pole piece 10. This bolt, furthermore, clamps to the outer side of the member 2 a brass support 11 and to the outside of the other member 3 a brass support 12. On the upper end of the pole piece 10 there is a magnetic coil 13 through the medium of which the armature 14 is op-

erated. This armature has one end resting up against an angle heel piece 15 which is secured to the member 11 in any suitable manner as for example, by a screw. The other end of the armature which is elongated passes through a hole in the lower end of the link 16 where the two are held together in a flexible joint by collodion. The other end of the link 16 is secured to the diaphragm 17 in any suitable manner. The diaphragm is mounted on the brass cup 18 between the insulating rings 19 of suitable soft material as for example, rubber, to keep it from metallic contact with the cup. This cup is secured to the brass supports 11 and 12 by suitable screws. The cup is provided with a cap 20 which is secured to the cup as for example by screws. This cap has a threaded orifice into which the tube 21 is screwed as shown, said tube forming an exit for the sound produced by the diaphragm 17. The whole instrument is incased by a tube 22 which is supported by the heads 23 and 24 as shown. The head 23 is held in place by screws 25 which are embedded in the soft iron piece that is clamped between the limbs of the magnet. The cap 23 is screwed to the tube 21. It will be understood that a permanent magnet in this instrument acts upon the armature 13 to draw it toward the pole piece 10 with considerable force. This armature in turn pulls on the diaphragm 17 and the end which rests on the limb 2 is only held there by magnetic force. There are no screws or other devices except the heel piece 15 to hold it in position. When the instrument is put together the connection between the armature 14 and diaphragm 17 is adjusted so that the diaphragm takes all the pull and holds the armature lifted from the pole piece 10 a suitable distance. Now, after the instrument is closed and connected up and put in use it sometimes becomes desirable to vary the adjustment of the armature 14. Ordinarily it is necessary to disconnect the instrument for doing this. Sometimes however, a series of links and levers are provided which enable the adjustment to be made without taking the instrument to pieces but it involves the mechanical meddling with the connection between the diaphragm and the armature which is detrimental to the instrument. Furthermore, in such cases the levers supplied to reduce the pull of the armature necessarily prevent the instrument from being



sensitive enough to reproduce the higher harmonics that enable the ear to distinguish between the quality of one instrument and that of another or between the quality of voices. In the apparatus here disclosed the adjustment to which we refer is accomplished by the soft iron screw 26 without in any way disturbing mechanically the connection between the armature and the diaphragm. This screw operates to shunt off the lines of force from the armature 14. Even while the instrument is at work the adjustment may be carried on to vary it as described so as to adapt it for sounds of great volume or sound of less volume. By moving the screw back and forth the armature 14 may be made to recede from or draw nearer to the bolt piece. With this instrument I have found it possible to reproduce properly the notes of a piano for example and also the human voice so that differences in quality are readily detected. Notwithstanding that the instrument is so accurate it is made with less parts and in a simpler manner than any similar instrument heretofore. The particular arrangement of the parts of the magnet and of the casing contribute not only toward making the instrument more compact and simple but contribute also to its efficiency. As shown in the drawings the electromagnet which has as its core the pole piece 10 is electrically connected with any suitable circuit which may contain a microphone and a battery for energizing the electromagnet and for varying the energizing current in its circuit.

The particular arrangement which is above described therefore, shows the provision of an armature which is designed to operate while under the action of two opposing forces. One of these opposing forces is the tension which is produced by the diaphragm assisted by the reinforcing cushion upon which the diaphragm rests. The other opposing force is the magnetic field of the magnet which also acts upon the armature 14. These two opposing forces are balanced through the medium of the lever arrangement which is provided between the magnet and the diaphragm. This lever has one fulcrum resting upon limb 2 of the magnet and uses the magnetic field as a power and the opposing tension as a weight. By this arrangement the opposing forces are so balanced after adjustment that if the armature 14 is moved by external means either toward or away from the pole piece this movement causes, of course, a variation in the magnetic pull on the armature and it causes a corresponding variation in the tension opposing the same so that the armature remains just where it is left. For example if we take a toothpick and move the armature away from the pole piece it remains. If we bring it toward the pole piece it remains.

This is the first time that this result has ever been obtained in an instrument of this character. Referring to Fig. 3, M represents the magnetic pull on the armature and T the tension. The curve V shows the relation of these forces. It is obvious that this armature may be moved by an external force applied for example through the medium of a tooth-pick to any point located on the curve between the points P and Q and that it will remain balanced there. But if taken beyond the limit indicated by the points P and Q the balance will be disturbed. Also it will be seen that this balance may be disturbed by energizing the electromagnet 13 to increase the magnetic pull so that the armature will stay where put by the tooth-pick, thus impairing the efficiency of the instrument. Therefore, I prefer to use in connection with this instrument alternating currents for vibrating the diaphragm as indicated in the circuit Fig. 1. Of course, it will be understood that the magnetic pull may be produced by an electromagnet instead of by a permanent magnet as described in this case and then balance the instrument to permit it to respond to the sound undulations which may be superimposed upon the magnetizing current, but with such an arrangement the balance will be disturbed each time that the energizing circuit is broken when the instrument is disconnected. In either case however, the principle is the same. As has been stated the point at which the armature engages the link that is fastened to the diaphragm is connected with collodion. This collodion forms a flexible joint of sufficient consistency to hold the armature in position and at the same time prevent any undesirable movement between the armature and the link.

What I claim is:

1. In an electrical reproducer a permanent magnet having two limbs bolted in parallel, one of which limbs sets higher than the other, and also one of said limbs having at one end a soft iron pole piece extending flush with one end of the higher limb and an electromagnet located thereon, the other end of said limb being perforated for mounting the instrument, a diaphragm mounted upon supports resting upon both said magnet members, and an armature for said magnet one end resting on the higher limb and the other end supported by the diaphragm directly, said instrument inclosed in a case, the lower limb being located within, and coinciding with the longitudinal axis of the casing but with the perforated end projecting through the end of the casing, the higher limb of said magnet being wholly contained within said casing.

2. In an electrical reproducer a perma-



5    nent magnet having two members bolted in  
parallel, one of which members sets higher  
than the other, and also one of said limbs  
having at one end a soft iron pole piece ex-  
tending flush with one end of the higher  
magnet member, and an electromagnet lo-  
cated thereon, the other end of said mem-  
ber being perforated for mounting the in-  
strument, an armature for said magnet one  
10   end resting on the higher end of the higher  
member and a diaphragm mounted upon  
supports resting upon both said magnet  
members, said magnet inclosed in a case  
the lower magnet being located with its lon-  
15   gitudinal axis coinciding with the lon-  
gitudinal axis of the casing but with the per-  
forated end projecting over the end of the  
casing, the higher limb of said magnet being  
wholly contained within said casing, and a  
20   magnetic shunt for deflecting the magnetic  
field from the armature.

3. In an electrical reproducer a magnet,  
an armature, a magnetic field acting upon

said armature a tension producing means  
acting upon said armature in opposition to 25  
said field, a diaphragm controlled by said  
armature through the medium of a link and  
a joint, said joint cemented together by non-  
metallic flexible material to avoid rattling.

4. In an electrical reproducer a magnet, 30  
an armature, a magnetic field acting upon  
said armature a tension producing means  
acting upon said armature in opposition to  
said field, a diaphragm controlled by said  
armature through the medium of a link and 35  
a joint, said joint cemented by non-metallic  
flexible material to avoid rattling, and a  
magnetic shunt for varying the magnetic  
pull of the armature on the diaphragm.

Signed by me at Chicago, Illinois, this 40  
16th day of July, 1914.

JOHN J. COMER.

Witnesses:

GEORGE A. YANOWSKI,  
CHAS. M. CANDY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."

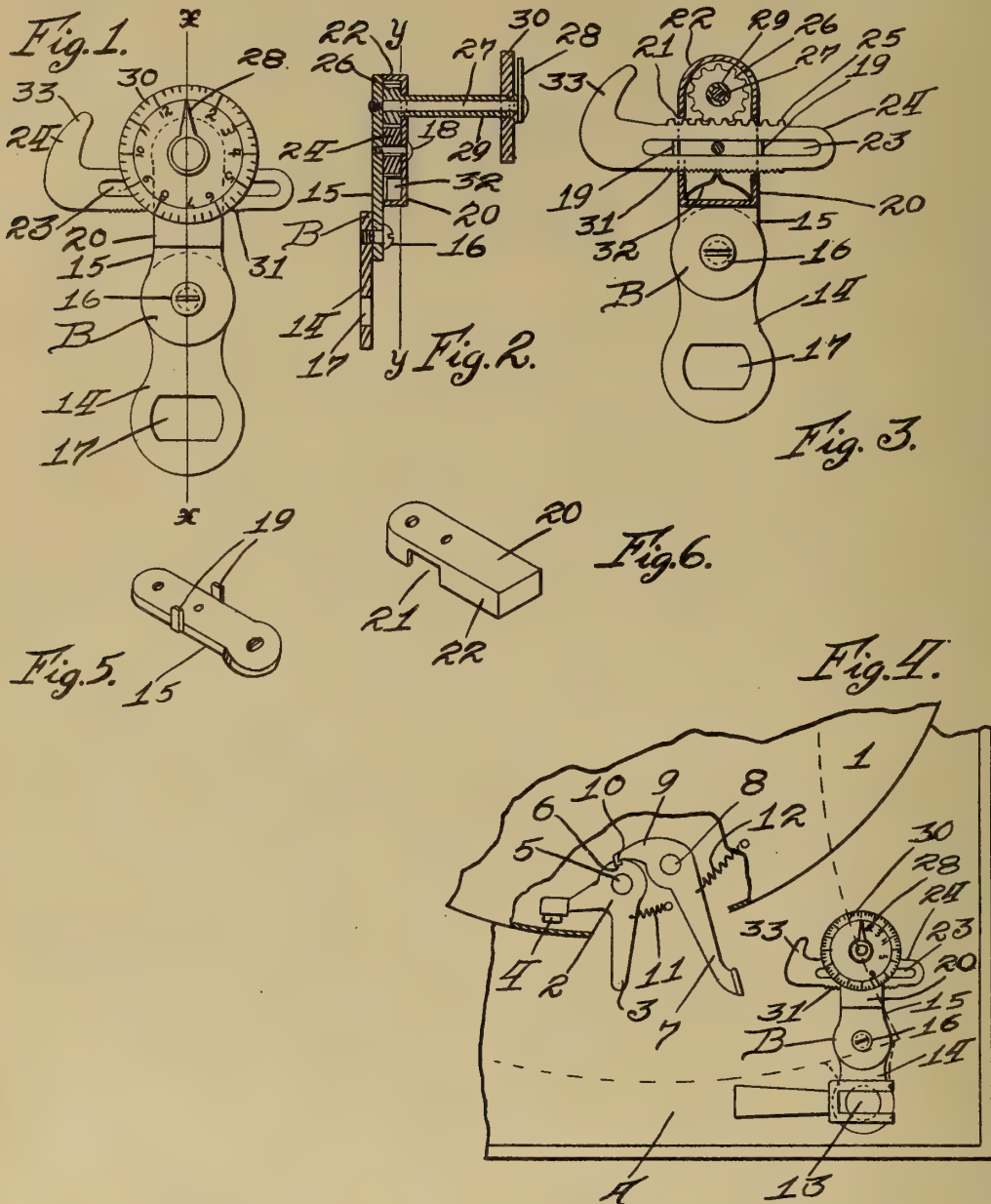


PHONOGRAPH STOP,  
#1,230,763-----F. A. Nolan,  
Patented-June 19th, 1917.  
Filed-August 6th, 1915.



1,230,763.

Patented June 19, 1917.



Inventor:  
 Francis A. Nolan.  
 by: J. S. Bradbury.  
 Attorney.

# UNITED STATES PATENT OFFICE.

FRANCIS A. NOLAN, OF ST. PAUL, MINNESOTA.

## PHONOGRAPH-STOP.

1,230,763.

Specification of Letters Patent. Patented June 19, 1917.

Application filed August 6, 1915. Serial No. 44,028.

*To all whom it may concern:*

Be it known that I, FRANCIS A. NOLAN, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented a new and useful Improvement in Phonograph-Stops, of which the following is a specification.

The primary object of this invention is the production of a simple and inexpensive stop which can be easily and quickly attached to or detached from sound reproducing machines for automatically setting the brake and stopping the rotation of the turn table upon which the record tablet is carried immediately when the playing of a record is completed.

More particularly this invention includes modifications of the structure or structures set forth in my companion applications Serial Number 3763 filed January 22, 1915, and Serial Number 36,221, filed June 25, 1915, but not therein specifically claimed.

In the accompanying drawing forming part of this specification, Figure 1 is a plan of my invention; Fig. 2 is a section taken on the line X—X, Fig. 1; Fig. 3 is a section taken on the line Y—Y, Fig. 2; Fig. 4 is a plan of a detail of a sound reproducing machine, part of the structure being broken away; and my invention attached in position for use; Figs. 5 and 6 are perspective views of parts of my invention.

In Fig. 4 of the drawing is shown a conventional type of Edison sound reproducing machine A, or so much thereof as is necessary to a full understanding of the manner in which my invention is to be attached and used therewith. In this figure, the numeral 1 indicates the turn table, 2 the brake which comprises a hand operable brake setting arm 3 extending outwardly from below the turn table 1 and the usual brake shoe 4, the hub of the brake being pivotally mounted within the machine at 5 and being provided with a notch 6 in its periphery as shown. A brake releasing member 7 of usual construction is pivotally mounted at 8 between its ends and the extremity 9 thereof is provided with a tooth 10 adapted to engage within the notch 6 formed in the hub of the brake to hold the brake shoe removed from frictional engagement with the turn table. A helical spring 11 is secured at one of its ends to the brake arm 3 and at its other end to a suitable

portion of the casing of the machine, the object of this spring being to retain the brake shoe in contact with the table; while one end of a similar spring 12 is secured to the brake releasing member 7 and the other end thereof to the casing, so as to hold the tooth 10 constantly in contact with the hub 5 of the brake. The machine is further provided with a revoluble member or shaft 13 having flattened surfaces upon which my improved stopping device is adapted for securance as will appear. It will be understood that the shaft 13 is operably connected with a movable part of any mechanism to which my invention is applicable for use and in the manner more specifically pointed out in my co-pending application for stops, filed June 25, 1915, Serial Number 36,221, so that the shaft is turned in synchronism with the movement of the sound box (not shown) in the usual manner.

In the drawings, Figs. 1 to 6 inclusive, show the preferred form of my device, wherein B represents a two piece base or support in the form of a lower arm 14 and an upper arm 15, said arms being adapted to be rigidly held in substantial alinement or angularly adjusted with respect to one another by means of a screw 16. A suitably shaped opening 17 is formed in the lower arm 14 whereby the device may be operably attached to the shaft 13 as desired. The upper arm 15 comprises a plate having up-standing lugs 19, on either of its side edges, in transverse alinement and a closure member 20 adapted to be secured by a screw 18, or other suitable means upon one face of the plate, the lugs of which plate intersect cut out portions 21 in the side walls 22 of the closure member, and extend across an elongated groove 23 formed in a striker member 24 to guide the same, said member being adapted for reciprocation within and through the cut out portions in the walls of the closure member. The reciprocable member is provided on one of its longitudinal edges with rack teeth 25 intermeshing with the teeth of a pinion 26 revolubly mounted on a shaft 27 rigidly secured on the plate and extending beyond the outer surface of the closure member and carrying at its outermost end an indicating finger 28. Disposed about the extended portion of the shaft 27 is a revoluble sleeve 29 to the outer end of which is attached or



secured a graduated dial 30 in close proximity to the stationary indicating finger 28, the sleeve at its inner end being secured to the pinion 26 for movement therewith.

5 On the other longitudinal edge of the reciprocable striker member 24 is formed another set of rack teeth 31 which are engaged by a spring retarding pawl 32 to retain the same in its different adjusted positions. The member 24 terminates in a suitably shaped contact end 33, the object of which will hereafter appear.

10 The operation of the mechanism is as follows: When a record is placed on the table and the length of the record is determined by a suitable symbol or indication which may be placed thereon, the striker member 24 is moved in the proper direction until the dial is turned so that the finger registers with the desired number. The continuous movement of the mechanism is imparted to the supporting member 14, 15 through its connection with the revoluble shaft 13 and the striker member 24 advanced toward the brake releasing member 7 with which its end 33 eventually impinges or presses to release and throw the brake shoe 4 into frictional contact with the turn table and thus stop further movement of the same.

20 The advantages of my device as above described will be apparent to those skilled in the art to which it refers. The operator merely has to place the record upon the turn table, adjust the member 24 in the manner described, and the record may then be reproduced without further attention on the part of the operator. In devices of this character, it is very essential to successful operation, that the stop mechanism be of such a nature as to permit it to conform to and so overcome defects of workmanship, natural wear on the parts, and the like. This I accomplish by providing a supporting member for attachment to the revoluble shaft, such member consisting of two arms which are primarily adjusted to the particular machine with which the device is to be used and thereafter held in such adjustment by means of the screw 16. To facilitate setting the dial in proper position so that the table will stop the instant the playing of a record is completed, the records are preferably numbered or marked according to the length of their sound grooves or sizes to correspond with the proper marking on the dial.

30 In accordance with the patent statutes, I have described the principles of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof, but I desire to have it understood that the construction shown is only illustrative, and that the invention can be carried out by other means and applied to uses other than those above set

forth within the scope of the following claims.

Having described my invention, what I claim as new and desire to protect by Letters Patent is:

1. The combination in a sound reproducing machine having a traveling element, a turn table and brake mechanism to prevent the table from revolving, of a support secured adjacent one of its ends to said traveling element for movement thereby, said support comprising members having their adjacent ends pivotally secured together and adapted to be retained in a multiplicity of angles with respect to one another, and means journaled upon the outermost member of said support for relative adjustment with respect thereto adapted to impinge against and set said brake mechanism at a predetermined time.

2. The combination in a sound reproducing machine having a traveling element, a turn table and brake mechanism to prevent the table from revolving, of a support secured adjacent one of its ends to said traveling element for movement thereby, a member journaled upon the other end of said support for relative adjustment with respect thereto, and a device carried by said member for a multiplicity of axial adjustments with respect thereto adapted to impinge against and set said brake mechanism at a predetermined time.

3. The combination in a sound reproducing machine having a traveling element, a turn table and brake mechanism to prevent the table from revolving, of a support secured adjacent one of its ends to said traveling element for movement thereby, a member journaled upon the other end of said support for relative adjustment with respect thereto, a spool revoluble about its axis upon said member, and means reciprocally mounted upon said member for operation by the lower end of said spool to impinge against and set said brake mechanism at a predetermined time.

4. The combination in a sound reproducing machine having a traveling element, a turn table and brake mechanism to prevent the table from revolving, of a support removably secured at one of its ends to said traveling element for movement thereby, a member journaled upon the other end of said support for relative adjustment with respect thereto, a spool revoluble about its axis upon said member, said spool having a toothed pinion, and a striker arm having rack teeth on one of its longitudinal edges meshing with said toothed pinion whereby said striker arm may be adjustably reciprocated to impinge against and set said brake mechanism at a predetermined time.

5. The combination in a sound reproducing machine having a traveling element, a



turn table and brake mechanism to prevent  
the table from revolving, of a support re-  
movably secured at one of its ends to said  
traveling element for movement thereby, a  
5 member journaled upon the other end of  
said support for relative adjustment with  
respect thereto, a spool revoluble about its  
axis upon said member, said spool having a  
toothed pinion, a striker arm having rack  
10 teeth on one of its longitudinal edges mesh-

ing with said toothed pinion whereby said  
striker arm may be adjustably reciprocated  
to impinge against and set said brake mech-  
anism at a predetermined time, and means  
associated with said striker arm for retain- 15  
ing it in selected position.

In testimony whereof, I have signed my  
name to this specification.

FRANCIS A. NOLAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."



PHONOGRAPH STOP.  
#1,230,764-----F.A.Nolan.  
Patented-June 19th, 1917.  
Filed-September 11th, 1915.



F. A. NOLAN.  
 PHONOGRAPH STOP.  
 APPLICATION FILED SEPT. 11, 1915.

1,230,764.

Patented June 19, 1917.

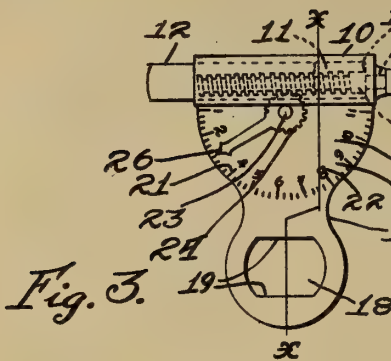


Fig. 3.

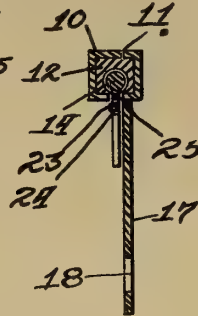


Fig. 4.

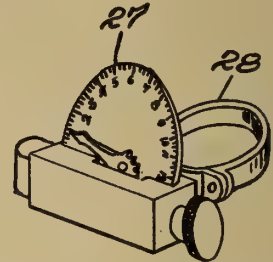


Fig. 5.

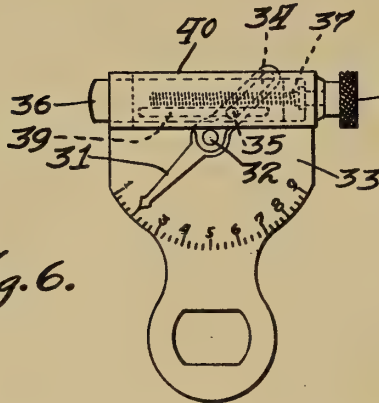


Fig. 6.

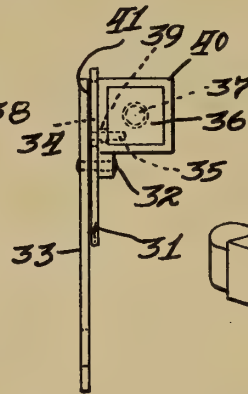


Fig. 7.

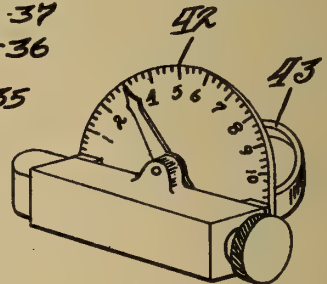


Fig. 8.

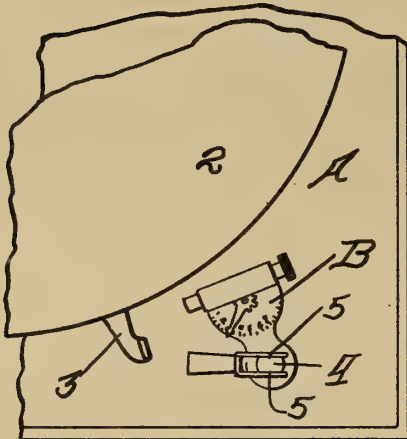


Fig. 1.

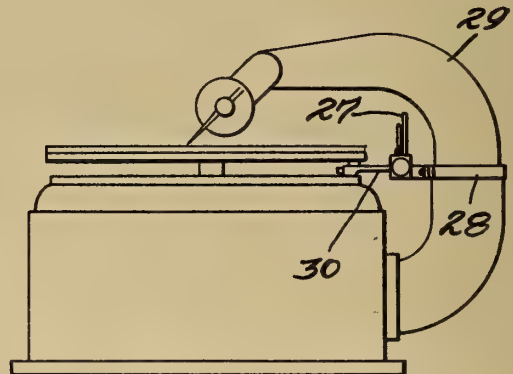


Fig. 2.

Inventor:  
 Francis A. Nolan,  
 by: S. Bradbury  
 Attorney.

# UNITED STATES PATENT OFFICE.

FRANCIS A. NOLAN, OF ST. PAUL, MINNESOTA.

PHONOGRAPH-STOP.

1,230,764.

Specification of Letters Patent. Patented June 19, 1917.

Application filed September 11, 1915. Serial No. 50,125.

*To all whom it may concern:*

Be it known that I, FRANCIS A. NOLAN, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented a new and useful Improvement in Phonograph-Stops, of which the following is a specification.

This invention relates to improvements in stops for sound reproducing machines, which are adapted to automatically cause the arrest of rotation of a record structure when the playing of a record is completed; so as to avoid scratching the record by a needle or stylus. More particularly this invention relates to modifications of the structure or structures set forth in my companion applications Serial Number 3,763, filed Jan. 22, 1915; Serial Number 36,221, filed June 25, 1915, Serial Number 44,028 filed August 6, 1915, and application executed by me on the 21st day of August, 1915, Serial Number 50,124, filed September 11, 1915.

To these ends my invention comprises the features of construction and combination of parts, which will hereinafter be more particularly described and claimed.

In the accompanying drawing forming part of this specification, Figure 1 is a plan of a detail of a sound reproducing machine of the conventional Edison type, to which my invention is shown applied; Fig. 2 is a side elevation of a sound reproducing machine of the conventional Victor type, to which my invention is shown applied; Fig. 3 is a plan of my invention of that type, which is applicable to the conventional Edison type of sound reproducing machine; Fig. 4 is a section of Fig. 3 taken upon the line X—X; Fig. 5 is a perspective of a modification of my invention of that type which is applicable to the conventional Victor type of sound reproducing machine; Fig. 6 is a plan of an alternative construction of my invention of that type which is applicable to the conventional Edison type of sound reproducing machine; Fig. 7 is an edge view of the construction illustrated in Fig. 6, and Fig. 8 is a perspective of an alternative construction of my invention of that type which is applicable to the conventional Victor type of sound reproducing machine.

Referring to Fig. 1 of the drawing, A indicates a detail of the conventional type of Edison sound reproducing machine, 2 a detail of the turn table, 3 the arm for

releasing or setting the brake and arresting the turn table from further movement, and 4 the revoluble shaft member having flattened surfaces 5, all of said parts being of usual construction. It will be understood that the shaft 4 is operably connected with a movable part of any mechanism with which my invention is applicable for use, and in the manner more specifically pointed out in my co-pending application for patent filed June 25, 1915, Serial Number 36,221, so that the shaft is turned in synchronism with the movement of the sound box and tone arm not shown in the usual manner. Referring to Figs. 1, 3 and 4, B indicates my improved stop, which is provided with a rectangular housing 10 forming a long passage 11, in which the brake engaging pin 12 is slidable and from one end of which said pin projects. The inner end of said passage is closed, excepting for a small opening 13 in which a screw adjusting shaft 14 is journaled, the inner end of said shaft being threaded into the brake engaging pin 12 and provided on its outer end with a turning member 15 by which the screw can be revolved by hand. The screw shaft is formed with a shoulder 16 which cooperating with the turning member 15 prevents longitudinal movement of the screw shaft in the housing. The cross sectional shape of the brake engaging pin 12 corresponds with the rectangular shape of the passage 11 in the housing to prevent the pin from turning. Extending laterally from the housing is a supporting plate 17, the outer end of which has an opening 18 with flattened sides 19, said opening being adapted to fit over the upper end of the shaft 4. The flattened sides 19 engage the flattened sides 5 on the shaft 4, causing the stop B to turn with the shaft 4, in synchronism with the movement of the sound box of the sound reproducing machine. The portion of the supporting plate 17 between the opening 18 and the housing is formed with a dial 20, the face of which is marked with a graduated scale 21 having ordinals 22 or other indicating marks corresponding with the graduations. Near the center of this dial a pivot 23 revolubly secures a toothed pinion 24, the teeth of which mesh with the screw threads on the screw shaft 14, said pinion passing freely through a slot 25 extending longitudinally of the housing and brake engaging pin 12 and entering the threaded



passage in which the screw shaft 14 engages the brake engaging pin. The pinion 24 carries an index pointer 26, which as the pinion is turned by the screw shaft indicates on the dial 20, the position assumed by the brake engaging pin longitudinally of the housing.

In use the stop is engaged over the turning member 4 and the record disks are numbered according to the lengths of their sound grooves. These numbers are so arranged, as to correspond with the ordinals on the dial 20, so that in order to stop a record when the sound box reaches the end of its groove, the turning of the screw shaft 14 until the pointer 26 registers with the number on the dial, which corresponds with the number on the record tablet, moves the brake engaging pin 12 into suitable position, so that it will engage the brake releasing lever 3 at the proper instant, and cause the brake to arrest further movement of the turn table instantly when the playing of the record has been completed.

In Fig. 5 the same construction as illustrated in Figs. 3 and 4 is shown, excepting that the dial instead of being horizontal as illustrated in Figs. 3 and 4 is arranged vertically on the housing, said dial 27 being in the form of a semi-disk without the shaft 4 engagement, illustrated in Figs. 3 and 4. This type of construction is shown provided with a split collar 28 extending horizontally from one side of the housing, which enables my improved stop to be clamped to the tone arm 29, (see Fig. 2), immediately adjacent the pivot point upon which said arm swings. This type of stop is thus applicable for use on the conventional type of Victor sound reproducing machine, and is adapted to cooperate with the brake releasing member 30 in the same manner as in the construction illustrated in Fig. 1. It will be observed that the graduations on the dial are readily read from in front of the machine instead of the operator having to look down upon the dial when the dial is horizontal.

The modification illustrated in Figs. 6 and 7 is of substantially the same construction as illustrated in Figs. 3 and 4, excepting that instead of a toothed pinion being employed, the index arm 31 is in the form of a lever pivoted at 32 between its ends upon the horizontal supporting plate 33, the opposite end of said lever from that forming the pointer 31 being formed with a longitudinal slot 34 in which a pin 35 carried by the brake engaging pin 36 passes, whereby as the screw shaft 37 is turned by the hand piece 38, the lever 31 is swung upon its pivot and caused to indicate on the dial the position assumed by the brake engaging pin 36. A suitable passage 39 is formed in the lower surface of the housing

40 in which the pin 35 slides freely and the housing 40 is suitably mounted upon the supporting plate 33, leaving a suitable passage 41, in which the lever arm 31 is free to swing as described.

In the construction illustrated in Fig. 8 substantially the same form of stop is illustrated as shown in Figs. 6 and 7, excepting that instead of the dial 42 being arranged in horizontal position, it is arranged vertical in much the same manner as illustrated in Fig. 5, and a split collar 43 is also provided extending laterally or horizontally from the housing, whereby the device can easily and quickly be applied to the conventional type of Victor sound reproducing machine, which is illustrated in Fig. 2.

In all of the structures set forth, it will be observed that a micrometer adjustment is provided for setting the brake engaging pin, whereby accurate and quick adjustment is provided, and whereby the device remains adjusted until intentionally re-adjusted by an operator.

In accordance with the patent statutes, I have described the principles of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof, but I desire to have it understood that the construction shown is only illustrative, and that the invention can be carried out by other means and applied to uses other than those above set forth within the scope of the following claims.

Having described my invention, what I claim as new and desire to protect by Letters Patent is:

1. The combination in a sound reproducing machine having a traveling element, a turn table and brake mechanism to prevent the table revolving, of a support secured to said traveling element, said support having a graduated dial thereon, a housing carried by said support, a stop member slidably disposed within and through one end of said housing and adapted to impinge against and set said brake mechanism, means having screw threaded engagement with said stop member whereby said stop may be positioned to actuate said brake mechanism at a predetermined time, and means mounted upon said support actuated by the movements of said stop engaging means to indicate upon the dial the adjustment of said stop.

2. The combination in a sound reproducing machine having a traveling element, a turn table and brake mechanism to prevent the table revolving, of a support secured to said traveling element, said support having a graduated dial thereon, a housing carried by said support, a stop member slidably disposed within and through one end of said housing and adapted to impinge against and set said brake mechanism, means having



screw threaded engagement with said stop member whereby said stop may be positioned to actuate said brake mechanism at a predetermined time, and means pivotally mounted upon said support actuated by the movements of said stop engaging means to indicate upon the dial the adjustment of said stop.

3. The combination in a sound reproducing machine having a traveling element, a turn table and brake mechanism to prevent the table revolving, of a support secured to said traveling element, said support having a graduated dial thereon, a housing carried by said support provided with a longitudinal slot, a passaged stop member slidably disposed within said housing and adapted to impinge against and set said brake mechanism, said stop being internally screw threaded and having an elongated slot registering with the slot in said housing, an externally threaded shaft engaging the threads of said stop for adjustably positioning the stop to actuate said brake mechanism at a predetermined time, a toothed pinion pivotally mounted upon said support and extending through said registering slots for operative engagement with said threaded shaft and an index pointer carried by said pinion to indicate upon the dial the adjustment of said stop.

4. The combination in a sound reproducing machine having a traveling element, a turn table and brake mechanism to prevent

the table from revolving, of a support having a dial provided with numbered graduations, said support being adapted for attachment to said traveling element, stop means movable transversely of said support to contact with and set said brake mechanism, a member rotatably mounted upon said support and having telescoping threaded engagement with said stop means for moving the same, and means actuated by one of said movable parts to indicate upon said dial the adjustment of the stop means.

5. The combination in a sound reproducing machine having a traveling element, a turn table and brake mechanism to prevent the table revolving, of a support having a dial provided with numbered graduations adapted to be secured to said traveling element, said dial assuming approximately vertical position when said support is secured to said traveling element, stop means movable relatively with respect to said support adapted to contact with and set said brake mechanism, a member rotatably mounted upon said support and having telescoping threaded engagement with said stop means for moving the same, and means actuated by one of said movable parts to indicate upon said dial the adjustment of the stop means.

In testimony whereof, I have signed my name to this specification.

FRANCIS A. NOLAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

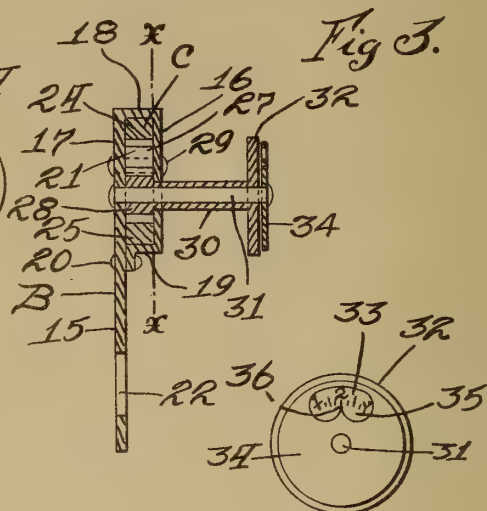


PHONOGRAPH STOP,  
#1,230,765-----F.A.Nolan,  
Patented-June 19th, 1917.  
Filed-September 11th, 1915.



1,230,765.

Fig. 2.



A perspective view of the machine in operation. The workpiece is being cut by the tool. The machine is shown in a side profile, with the workpiece resting on the bed. The tool is positioned above the workpiece, and the cutting process is indicated by the position of the tool and the workpiece. The machine is labeled with the number 40, and the workpiece is labeled with the number 41. The tool is labeled with the number 42, and the bed is labeled with the number 43.

THE NORRIS PETERS CO. PHOTO-LITHO. WASHINGTON, D. C.

# UNITED STATES PATENT OFFICE.

FRANCIS A. NOLAN, OF ST. PAUL, MINNESOTA.

## PHONOGRAPH-STOP.

1,230,765.

Specification of Letters Patent.

Patented June 19, 1917.

Application filed September 11, 1915. Serial No. 50,124.

*To all whom it may concern:*

Be it known that I, FRANCIS A. NOLAN, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented a new and useful Improvement in Phonograph-Stops, of which the following is a specification.

An object of this invention is to provide a stop for sound reproducing machines, which is adapted to automatically cause the arrest of rotation of a record structure when the playing of a record is completed, so as to avoid scratching the record by the needle or stylus.

More particularly this invention relates to modifications of the structure or structures set forth in my companion applications, Serial Number 3,763, filed Jan. 22, 1915; Serial Number 36,221, filed June 25, 1915, and Serial Number 44,028 filed August 6, 1915.

To these ends my invention comprises the features of construction and combination of parts which will hereinafter be more particularly described and claimed.

In the accompanying drawing forming part of this specification, Figure 1 is a plan of a detail of a sound reproducing machine of the conventional Edison type to which my invention is shown applied, part of the structure of the machine being broken away to more clearly expose its mechanism; Fig. 2 is a section of my invention taken upon the line X—X of Fig. 3; Fig. 3 is a section taken upon the line Y—Y of Fig. 2; Fig. 4 is a plan of a detail; Fig. 5 is a side elevation of a conventional type of Victor sound reproducing machine showing a modification of my invention applied thereto, and Fig. 6 is a perspective view of my invention constructed according to the modification illustrated in Fig. 5.

Referring first to Fig. 1 of the drawing, A indicates a detail of a conventional type of Edison sound reproducing machine, 2 the turn table and 3 the brake having a hand operable brake setting or releasing arm 4 extending outwardly from below the turn table and the usual brake shoe 5, the hub of the brake being pivotally mounted within the machine at 6 and provided with a notch 7 in its periphery as shown. A brake releasing member 8 of usual construction is pivotally mounted at 9 between its

ends and the extremity 10 thereof is provided with a tooth 11 adapted to engage within the notch 7 to permit holding the brake shoe removed from frictional engagement with the turn table. A helical spring 12 is secured at one of its ends to the brake arm 4 and at its other end to a suitable portion of the casing of the machine, the object of this spring being to urge the brake shoe against the turn table when released from engagement with the tooth 11. One end of a similar spring 13 is secured to the brake releasing member 8 and the other end to the casing, so as to hold the tooth 11 constantly in contact with the hub of the member 3. The machine is further provided with a revoluble shaft member 14 having flattened surfaces upon which my improved stopping device B is adapted for securance as will appear. It will be understood that the shaft 14 is operably connected with a movable part of any mechanism to which my invention is applicable for use, and in the manner more specifically pointed out in my co-pending application for patent for stops, filed June 25, 1915, Serial Number 36,221, so that the shaft is turned in synchronism with the movement of the sound box and tone arm (not shown) in the usual manner.

Referring to Figs. 1 to 4 inclusive, 15 indicates a housing formed by a single flat strip or plate of material shaped to produce a top 16 and bottom 17 in parallel relation and two sides 18 and 19, the latter being secured to the bottom, such as by rivets 20. This structure produces a passage 21, the walls of which serve as a guide in which the stop member C is adapted to slide. The free end of the plate 15 extends outwardly from the housing and forms a support near the outer end of which is a suitably shaped opening 22 whereby the device may be operably attached to the shaft 14 and supported thereby. The opening 22 has a pair of oppositely disposed flat sides 23, which engage corresponding sides on the shaft 14, so that the plate 15 will swing as the shaft 14 turns.

The stop C is a slide of loop shape having a double internal rack formed by a pair of parallel, oppositely and inwardly disposed rack teeth members or sides 24 and 25. In the space between the sets of rack teeth are disposed two driven gears 26 and 27, and one



drive gear 28, said driven gears being out of mesh together, but in mesh with the teeth of the rack member 24 and the drive gear 28 and the teeth of the drive gear 28 being also  
 5 in mesh with the teeth of the rack member 25. The gears 26 and 27 are respectively journaled upon shafts 29, which are riveted or otherwise secured to the sides 16 and 17 of the housing, while the pinion or gear 28  
 10 is formed on a sleeve 30, which is revoluble upon a shaft 31, said sleeve 30 passing through and being journaled in the top 16 of the housing and the shaft 31 being riveted or otherwise rigidly secured upon the  
 15 bottom member 17 of the housing and extending upwardly through said sleeve. The upper end of the sleeve 30 is formed with a hand operable turning wheel 32 suitably distanced above the top 16 of the housing, and  
 20 provided with a graduated dial 33 on its upper surface. The upper end of the stationary shaft 31 has rigidly mounted thereon a stationary cover disk 34 of less diameter than the diameter of the turning member 32,  
 25 and formed with a sight opening 35 through which the graduations of the dial 33 are visible, and with an indicating arm 36 co-operating with the dial to indicate the position assumed by the turning wheel.  
 30 In operation a record is placed on the turn table in the usual manner and my improved stop mechanism applied to shaft 14 as illustrated in Fig. 1, where it remains permanently. The slide constituting the  
 35 stop member C is then moved by turning the hand operable wheel 32 until the index arm 36 indicates on the dial 33 the number which corresponds with the length of the record groove in the record being played. As the  
 40 playing of the record proceeds the turning of the shaft 14 swings the stop member and the stop member is so arranged upon the arm 15 as to strike or press against the release arm 8 immediately when the playing  
 45 of the record is completed, whereupon the tooth 11 is disengaged from the notch 7 and the spring 12 causes the brake shoe 5 to press against and stop further revolution of the turn table automatically. The record tab-  
 50 lets can be marked in advance according to the lengths of their sound grooves, to correspond with said dial, so that by setting the dial according to the number on a record on the turn table the above operation will be  
 55 effected, and further revolution of the record stopped at a predetermined instant.

The gear wheels 26 and 27 may be replaced by any suitable number desired, their function being to distribute the application  
 60 of driving force for sliding the stop member into adjusted position evenly over both racks on the stop member, so as to prevent any binding effect in the guide opening 21, and also to prevent unintentional movement of  
 65 the guide member after it has been set by

turning the hand operable turning wheel 32. I have found in practice that by using a plurality of intermeshing gears for operating the slide movement of the slide is retarded sufficiently to prevent the slide from  
 70 getting out of adjustment by striking or pressing against the brake release or for any other unintentional reason. This obviates the use of an additional element for preventing the unintentional movement referred to.  
 75 The periphery of the turning wheel 32 may be knurled and the diameter of said wheel made sufficient so as to produce a suitable engaging surface projecting from the periphery of the cover plate 34 and enable the  
 80 operator taking a firm hold to turn the drive gear 28 and effect the movement of the slide easily and quickly. The stop member C is capable of use to apply either of its ends for effecting the operation of a brake  
 85 to stop further movement of the turn table.

In the construction illustrated in Figs. 5 and 6 my improvement is used in connection with the conventional type of Victor sound reproducing machine. Instead of the  
 90 plate 15 being mounted in a horizontal plane as shown in Fig. 1 it is substituted by a split collar 40, which is clamped about the tone arm 41 with the housing in a vertical plane and the dial 33 visible from in front  
 95 of the machine, instead of from above. By this means the stop is secured closer to the pivot point of the sound tube where it is most effective. In this construction the stop member C is operated in the same manner  
 100 as above described and the slide adjusted in accordance with the dial and the record which is placed upon the turn table to be played. Likewise as in the construction set forth in Fig. 1, one end of the slide or stop  
 105 member C presses against the releasing arm 42 of the brake shoe 43, and automatically releases the brake shoe into frictional contact with the turn table and stops further  
 110 movement of the same immediately upon the end of the record being reached by the sound box and the stop member C striking against the release member 42.

This invention is also applicable to sound reproducing machines employing cylindrical  
 115 instead of disk records and wherever the term "turn table" is employed in the claims following, its meaning is to be construed as including a turning member for a cylindrical or disk record.  
 120

In accordance with the patent statutes, I have described the principles of operation of my invention, together with the apparatus which I now consider to represent the best  
 125 embodiment thereof, but I desire to have it understood that the construction shown is only illustrative, and that the invention can be carried out by other means and applied to uses other than those above set forth within  
 130 the scope of the following claims.



Having described my invention, what I claim as new and desire to protect by Letters Patent is:

1. The combination in a sound reproducing machine having a traveling element, a turn table and brake mechanism to prevent the table revolving, of a support secured to and movable with said traveling element, a stop member movable upon said support to impinge or press against and set said brake mechanism, said stop member having opposite racks and means for evenly applying a forceful movement simultaneously to both said racks.

2. The combination in a sound reproducing machine having a traveling element, a turn table and brake mechanism for stopping said table, of a support carried by and for movement with said traveling element, a stop member slidable upon said support to impinge or press against and set said brake having opposite racks and a plurality of intermeshing gears having teeth intermeshing with the teeth of both of said racks and means for driving said gears to effect the movement of said stop member.

3. The combination in a sound reproducing machine having a traveling element, a turn table and a brake for stopping said table, of a support carried by and for movement with said traveling element, a slide movable upon said support to impinge or press against and set said brake having opposite internal racks, a plurality of gears mounted upon said support in said slide and having teeth meshing with the teeth of both of said racks, means for turning said gears to adjust said slide on said support and a scale associated with said parts for determining the adjustment of said slide.

4. The combination in a sound reproducing machine having a traveling element, a turn table and a brake for stopping said table, of a support carried by and for move-

ment with said traveling element, a slide movable upon said support to impinge and press against and set said brake having spaced internal parallel racks, a plurality of gears mounted upon said support in said slide and having teeth meshing with the teeth of both of said racks, one of said gears carrying a hand operable turning element having a scale upon its surface and a cover plate carried by said support in stationary position over said wheel and having a sight opening through which the scale is exposed and an indicator cooperating with said scale whereby the position of adjustment of said slide can be determined.

5. The combination in a sound reproducing machine having a traveling element, a turn table and a brake mechanism to prevent the table revolving, of a support secured to and movable with said traveling element, a loop shaped stop member geared to said support for sliding movement thereon adapted to impinge against and set said brake mechanism, means operatively associated with said gear connection for actuating the same to move said stops into adjusted positions, and a dial cooperating with said stop to indicate its position.

6. The combination in a sound reproducing machine having a traveling element, a turn table and brake mechanism to prevent the table revolving, of a support secured to and movable with said traveling element, a loop shaped stop member interiorly geared to said support for sliding movement thereon adapted to impinge against and set said brake mechanism, means operatively associated with said gear connection for actuating the same to move said stops into adjusted positions, and a dial cooperating with said stop to indicate its position.

In testimony whereof, I have signed my name to this specification.

FRANCIS A. NOLAN.



METHOD OF MAKING PHONOGRAPH  
RECORDS,

#1,230,816-----J.W.Aylsworth,  
Patented-June 19th, 1917.  
Filed-March 8th, 1911.



J. W. AYLSWORTH.  
METHOD OF MAKING PHONOGRAPH RECORDS.  
APPLICATION FILED MAR. 8, 1911.

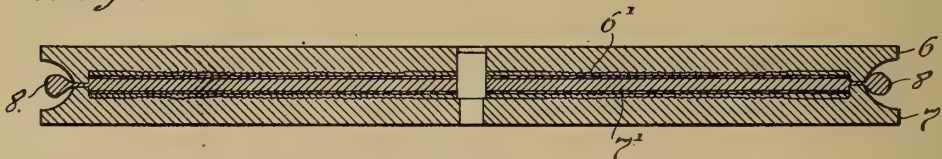
1,230,816.

Patented June 19, 1917.

*Fig. 1*



*Fig. 2*



*Fig. 3*



*Fig. 4*



*Witnesses:*  
Frank D. Lewis  
Frederick Bachmann.

*Inventor:*  
Jonas W. Aylsworth  
by Frank L. Green  
His Atty.

# UNITED STATES PATENT OFFICE.

JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## METHOD OF MAKING PHONOGRAPH-RECORDS.

1,230,816.

Specification of Letters Patent. Patented June 19, 1917.

Application filed March 8, 1911. Serial No. 613,114.

*To all whom it may concern:*

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States, and a resident of East Orange, in the county of Essex and State of New Jersey, have made a certain new and useful Invention in Methods of Making Phonograph-Records, of which the following is a description.

The object of the present invention is to produce a phonographic record having a surface layer of extremely hard material, such as the condensation products which form the subject matter of applications, Serial Numbers 496,060, 543,238 and 604,982, upon which United States Patents Nos. 1,102,630, 1,020,593 and 1,046,137 have been granted respectively. Hard phenolic condensation products are difficult to mold by the method of hardening in the mold, and they require considerable time for the operation. The present invention seeks to produce a phonograph record comprising the valuable properties of such products without the difficulties heretofore encountered. In a previous application, Serial No. 543,236, filed February 11, 1910, upon which United States Patent No. 1,146,388 has been granted, a method is described of forming the sound record after the material has been hardened, in which case the composition is designed to be somewhat plastic when hot. The present method is an improvement over the method therein disclosed in several important particulars. In pressing a substance which is plastic when hot, unless a high degree of plasticity is obtainable in the composition, there is difficulty in getting the impression perfectly all over the record, especially if it be a disk of considerable diameter. These difficulties are due to unevenness of the mold, which may be only in spots, or may be due to a variation in the thickness between the record face and the back, which causes an excessive pressure in the high spots and a deficiency of pressure in the low spots; and, where the material is not sufficiently plastic, this irregularity is not compensated for, and the result is a record in which the impressions are not perfectly taken all over. To overcome this, excessively high hydraulic pressures are required, which are objectionable on account of their tendency to spoil the record surface and distort the mold, as well

as being expensive because of the equipment required when such pressures are used.

The present invention in its preferred embodiment is accomplished by making a surface layer of a condensation product on a thin sheet of fabric, such as muslin or paper. This surface layer is preferably made of condensation products of phenol and formaldehyde or other substances containing the methylene radical, which products also contain a plasticity or solid solvent ingredient, such as one of those described in my applications Serial Nos. 496,060 and 604,982. Such products are described in my application, Serial No. 604,982 and are there termed "hot plastic condensation products," that is products which in their final state will soften sufficiently by heat to readily take an impression. The preferred composition for the surface layer is as follows:

Condensation product 100 parts by weight.

Solid solvent 15 to 40 parts by weight.

Wood flour or cotton flocks 15 to 30 parts by weight.

While, however, I prefer to use the above composition, various other hard substances such as celluloid, cellulose acetate, and casein may be used and fall within the scope of my invention.

The record is made by taking two such surface layers or veneers, which have been previously fully hardened, inserting between them a blank of a plastic composition which will not harden by heat, and which may be of entirely different composition from the surface layers. These layers and the blank are pressed in a heated mold where they are united and formed into a record of desired shape, the record impression being preferably pressed into the surface of the veneer at the same time.

Compositions for the blank may be the ordinary shellac mixtures with wood pulp as a loading material, or compositions comprising wood pulp or other filling agents and a fusible condensation product such as the well known shellac substitutes, and the substance which I term "phenol resin" in my applications Serial Nos. 496,060 and 541,764, upon which United States Patents 1,102,630 and 1,146,387 have been granted respectively.

This blank when heated becomes sufficiently plastic to flow under a moderate



pressure of say 600 to 1500 pounds to the square inch, and forms a backing which is yielding under the action of heat and pressure, so as to form a hydraulic equalizer of the applied pressure, so that no matter how uneven or irregular the mold surfaces may be, the pressure is distributed evenly on the veneer surfaces. The difference between the veneer and the blank or center portion of the record is that the veneer becomes simply softened by heat so it may be embossed readily, but does not have sufficient flowing qualities to enable it to be successfully used alone, excepting under special conditions; whereas, the internal part or blank is plastic when heated and will flow readily, hardens by cooling, may be made plastic again by heating any number of times and will not harden by heating.

The function of the fabric in the surface layer is to reinforce the same so that the layers or veneers may be readily handled without breaking, and so that the same may not break because of the flowing action of the internal blank while pressing. It also contributes enormously to the strength of the finished product.

The character of the fabric is important on account of the tendency to form cranks in the surface if the fabric is too stiff and unyielding and has a different coefficient of expansion and contraction from the material of the surface. Materials having such difference in coefficient of expansion may be used if the fabric is so chosen as to be yielding as a whole. Loosely woven cotton cloth, such as muslin, is preferable. Loose paper fabric such as filtering paper or Japanese rice paper may also be used, but they do not contribute so much to the strength of the product, as the cotton fabric. I have also found that when a condensation product is coated by rolling or pressing onto the cotton fabric in thin layers, the air is entirely removed, which is an important advantage in record surfaces.

In order that my invention may be better understood, attention is directed to the accompanying drawing forming a part of this specification and in which—

Figure 1 represents a central vertical cross section showing the blank, the fabric and the surface veneers in position to be molded;

Fig. 2 represents a similar view, showing the same parts in the mold after the pressure has been applied; and

Figs. 3 and 4 represent central vertical sections of finished records of different thicknesses. In all the views corresponding parts are designated by the same reference numerals.

Referring to the drawings, 1 represents the central blank, 2 and 3, the surface

veneers, and 4 and 5 the fabric on which the veneers are coated. The mold shown herein is what is termed a "flash mold", that is, a mold in which the excess material is forced out between the opposing parts 6 and 7 of the mold as shown at 8 in Fig. 2, when these parts are brought together in regulating the thickness of the product. The parts 6 and 7 of the mold are formed with matrices, 6' and 7' respectively; so that the record impressions are formed in the veneer simultaneously with the formation of the record. As shown in Fig. 1, the plastic blank 1 is of less diameter than the finished record so that in molding the record it will readily flow and fill the inner cavity between the veneer surfaces.

When it is desired to make a very thin disk record the blank is made thin, but when the pressure applied to the mold is completed, the excess of the inner material will be mostly squeezed out, leaving simply two veneer surfaces stuck together by the composition of the blank, as shown in Fig. 4. When a cylindrical record is formed, the process is exactly similar, except that the veneer and the blank are made in cylindrical form; but with a cylindrical record, it is not necessary to have the veneer upon both inside and outside surfaces, whereas on disk records, it is necessary to put the veneer on both sides to prevent warping.

The present invention is applicable to all kinds of phonograph records and other objects which it is desired to mold with a veneer surface.

Suitable compositions for the blank are wood flour, 50 to 100 parts, fusible condensation product, shellac or shellac substitute, colophony, or other binding gum, 50 to 100 parts. The composition of the blank may be adjusted and may be more or less plastic to suit the requirements of the particular veneer used. For instance, a veneer which requires a higher pressure to form the impression will require a stiffer plastic blank, and one which will take the impression readily at a lower pressure will require a blank which is more plastic.

In forming a veneer of an infusible phenolic condensation product, the cloth or fabric is placed on a sheet of polished metal, such as tin plate, and a blank of the unhardened condensation product is placed on the same and another piece of polished metal placed on top of this. Then the same is submitted to heat between two hot plates and a moderate pressure applied after the material has softened sufficiently to flow, whereby it is evenly distributed through and on the muslin, after which a higher temperature is given to the same, to harden the same by chemical action into its final, non-fusible hard state, care being taken that the reaction



temperature is not reached before the material has been properly distributed over the surface of the muslin. With some forms of condensation products, such as those described by Baekeland and others, this final hardening should be done under pressure. When the compositions referred to in applications Serial Nos. 604,982, 496,060, and 543,238 are used, it is not necessary to maintain pressure during the last stage of the operation or the hardening reaction. The pressure may be released, and the hardening may be done between the same hot plates which are used in distributing, or the coated muslin placed between the two metal sheets may be removed and placed in an oven, and there hardened at the minimum reaction temperature until it becomes infusible; and then to complete the hardening, the temperature may be raised considerably above the reaction temperature, which hastens the operation. After cooling, the metal sheets are readily detached. Another method of forming the veneer is to coat the muslin on calendar rolls, similar to the method of coating rubber on fabrics, hardening the same on heated drums or in ovens, and subsequently punching out the veneer blanks from these coated sheets.

The reaction temperature for the above mentioned composition lies between 200 and 250 degrees F., varying somewhat with the nature of the composition used.

The fundamental principle which contributes to the success of the present invention lies in having a yielding pressure-distributing internal part and a hard surface layer. It is obvious that other materials than those mentioned might be used for both the surface layer and for the internal part.

The plastic blank may be pressed to the full size of the record or other object, or as stated above, it may be less than the full size, so that in the final operation it will flow and entirely fill the inner cavity between the veneer surfaces. When a very thin disk record is made, the internal material is preferably made heavy by loading with heavy powders, such as metal powders, barium sulfate, etc. This is particularly desirable where the form of cut on the record is what is known as the up and down cut, which prevents the thin record from vibrating to such an extent as to weaken the volume of sound produced. Or the inner part may be lead or tinfoil.

The improved article of manufacture herein described is claimed in a divisional application Serial No. 160,964, filed April 9, 1917.

While I have mentioned certain preferred materials for the various parts of my improved record, various other materials may be used; and my invention is limited only as defined by the terms of the appended claims.

Having now described my invention what

I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. The process of making sound records which consists in coating two sheets of woven fabric with veneers of hard infusible material adapted to become slightly softened but not sufficiently plastic to flow when hot, forming a blank of material which is sufficiently plastic to flow when hot and hard when cold, inserting said blank between said sheets of fabric and simultaneously uniting said parts, molding the same into the desired shape, and forming record impressions in the outer surfaces of said veneers by heat and pressure, substantially as set forth.

2. The process of making sound records which consists in coating a sheet of woven fabric with a veneer of a hard infusible condensation product of phenol and a substance containing the methylene radical, forming a blank of material which is sufficiently plastic to flow when hot and hard when cold, and simultaneously uniting said parts, molding the same into the desired shape and forming a record impression in the veneer by heat and pressure, substantially as set forth.

3. The process of making sound records which consists in coating two sheets of woven fabric with veneers of a hard infusible condensation product of phenol and a substance containing the methylene radical, forming a blank of material which is sufficiently plastic to flow when hot and hard when cold, inserting said blank between said sheets of fabric, and simultaneously uniting said parts, forming the same into the desired shape, and forming record impressions in the outer surfaces of the veneer by heat and pressure, substantially as set forth.

4. The process of making sound records which consists in coating a sheet of woven fabric with a veneer of a hard infusible material adapted to become slightly softened but not sufficiently plastic to flow when hot, forming a blank of material which is sufficiently plastic to flow when hot and hard when cold, placing said blank in contact with said fabric, and uniting said parts and forming the same into the desired shape by heat and pressure, substantially as set forth.

5. The process of making sound records or the like which consists in pressing a heated layer of thermo plastic record composition against a sheet of fabric, and subsequently securing said layer and sheet to a suitable backing with said sheet intermediate said layer and backing, substantially as set forth.

6. The process of making sound records or the like which consists in pressing a heated layer of thermo plastic record composition against a sheet of fabric between polished plates, cooling said layer, and re-

moving the same together with said fabric from said plates, substantially as set forth.

7. The process of making sound records or the like which consists in pressing a  
5 heated layer of thermo plastic record composition against a sheet of fabric between polished plates, cooling said layer, removing the same together with the fabric from  
10 said plates, and subsequently securing said layer and fabric to a suitable backing with said fabric intermediate said layer and backing, and forming a record impression in said layer, substantially as set forth.

8. The process of making phonograph  
15 records or the like which comprises placing upon a sheet of fabric, a layer of composition which becomes hardened by chemical action upon application of sufficient heat, heating said layer to harden the same  
20 by chemical action, and securing said layer and fabric to a suitable backing with said fabric between said layer and backing, substantially as described.

9. The process of making phonograph  
25 records or the like which comprises placing a plastic layer of a composition which becomes hardened by chemical action upon application of sufficient heat against a sheet of fabric between polished plates, heating  
30 the said layer to harden the same by chemical action, and subsequently securing said layer and fabric to a suitable backing with said fabric between said layer and backing substantially as described.

35 10. The process of making phonograph records or the like which comprises placing

a plastic layer of a composition which becomes hardened by chemical action upon application of sufficient heat against a sheet of fabric between polished plates, heating  
40 the said layer to harden the same by chemical action, and subsequently securing said layer and fabric to a suitable backing with said fabric between said layer and backing, and forming a record impression in said  
45 layer, substantially as set forth.

11. The process of making phonograph records or the like which comprises placing a plastic layer of a composition which becomes hardened by chemical action upon ap-  
50 plication of sufficient heat against a sheet of fabric between polished plates, heating the said layer to harden the same by chemical action, and subsequently securing said layer and fabric to a thermo plastic backing with  
55 said fabric between said layer and backing substantially as described.

12. The process of making sound records or the like, which consists in rolling a  
60 heated layer of thermo-plastic record composition against a sheet of fabric, and subsequently securing said layer and sheet to a suitable backing with said sheet intermediate said layer and backing, substantially  
65 as set forth.

This specification signed and witnessed this 4th day of March, 1911.

JONAS W. AYLSWORTH.

Witnesses:

FREDERICK BACHMANN,  
ANNA R. KLEHM.

PHONOGRAPH,

#1,231,061-----Alexander N. Pierman,  
Patented-June 26th, 1917.  
Filed-February 17th, 1911.

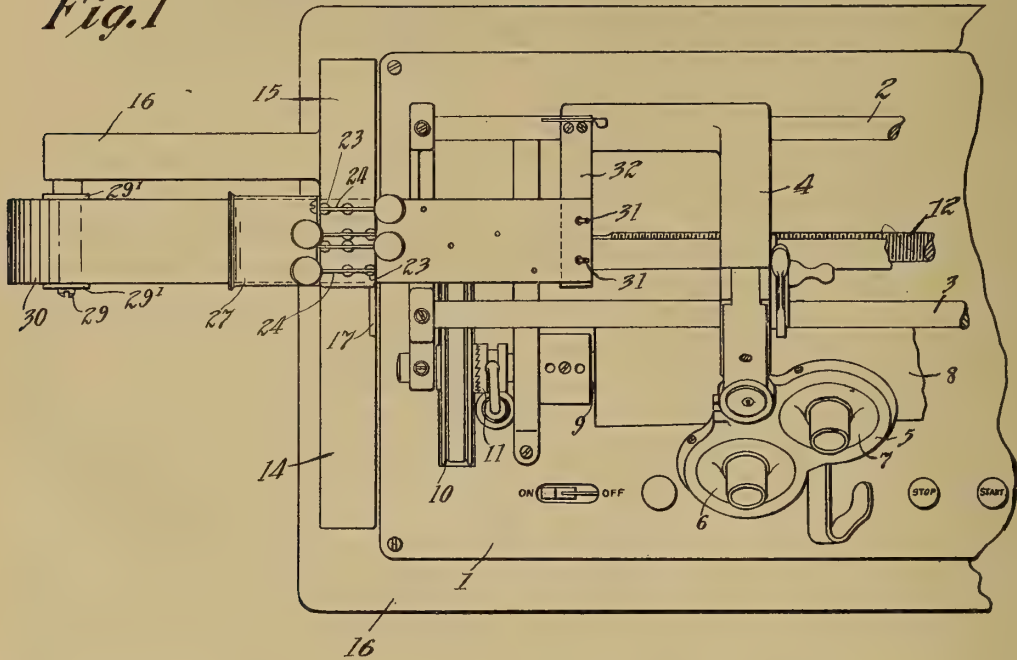


A. N. PIERMAN.  
 PHONOGRAPH.  
 APPLICATION FILED FEB. 17, 1911.

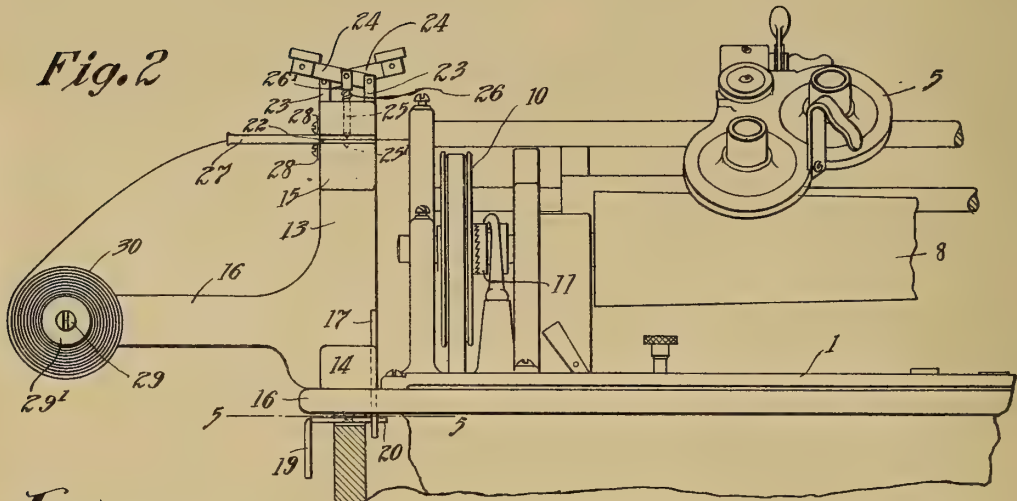
1,231,061.

Patented June 26, 1917.  
 2 SHEETS—SHEET 1.

*Fig. 1*



*Fig. 2*



*Witnesses:*  
*S. H. Dresser*  
*Fredrick Bachmann*

*Inventor:*  
*Alexander N. Pierman*  
*by Frank L. Dyer*  
*His Atty*



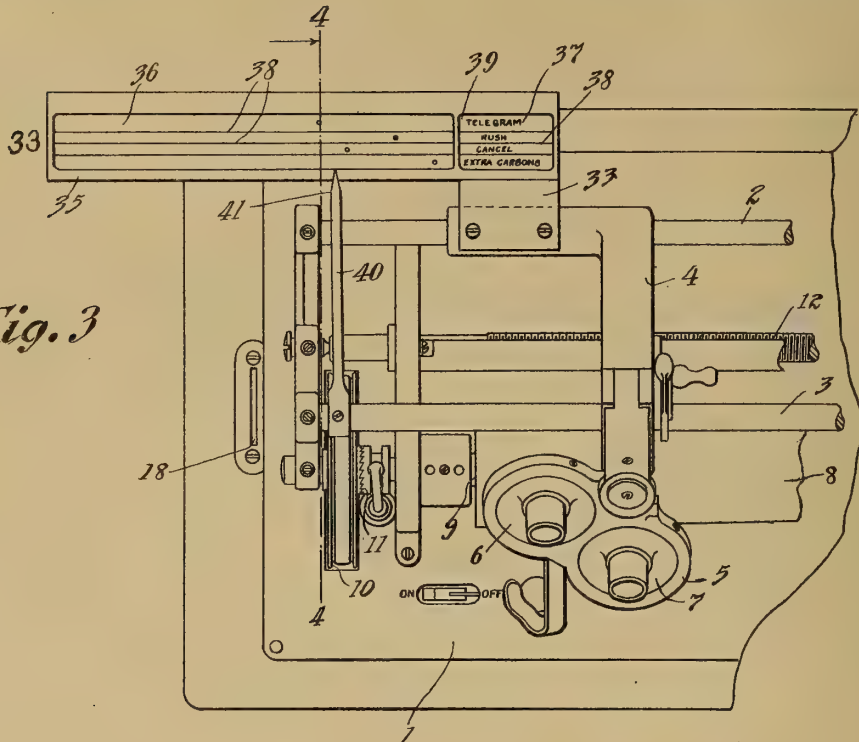
A. N. PIERMAN.  
 PHONOGRAPH.  
 APPLICATION FILED FEB. 17, 1911.

1,231,061.

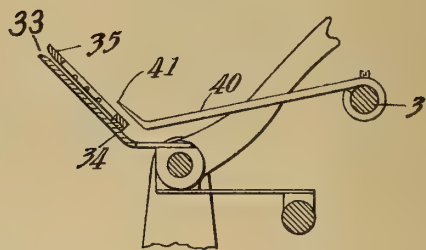
Patented June 26, 1917.

2 SHEETS—SHEET 2.

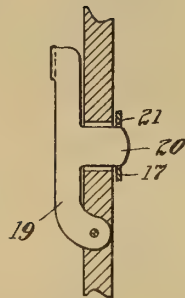
*Fig. 3*



*Fig. 4*



*Fig. 5*



*Witnesses:*

*Frederick Bachmann.*

*Inventor:*

*Alexander N. Pierman*  
*by Francis W. Brown*  
*his Atty.*



# UNITED STATES PATENT OFFICE.

ALEXANDER N. PIERMAN, OF NEWARK, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## PHONOGRAPH.

1,231,061.

Specification of Letters Patent. Patented June 26, 1917.

Application filed February 17, 1911. Serial No. 609,085.

*To all whom it may concern:*

Be it known that I, ALEXANDER N. PIERMAN, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs and more particularly to memorandum attachments for such machines. My object is to provide a new and improved device of this character which will permit the ready marking or indication of instructions for any desired part of the record; and in conformity with this object, my invention in its preferred form comprises means for moving a memorandum tape or other receiver across the record at a speed corresponding with that of the recorder and reproducer and means for marking or indicating on the said tape the desired instructions and the parts of the record to which they refer.

With this and other objects in mind, my invention consists in the features hereinafter set forth and claimed.

In the accompanying drawings forming a part of this specification and in the following description, I have shown and described the preferred form of my invention as applied to the Edison business phonograph; but it is understood that the same may be applied to phonographs of any type whatever.

Referring to the drawings:

Figure 1 is a plan view of a business phonograph provided with a form of my invention adapted for use by a dictator in marking the desired instructions on the memorandum tape;

Fig. 2 is a front elevation thereof;

Fig. 3 is a plan view of a like phonograph provided with a form of my invention for indicating to a transcriber the instructions to be followed in transcribing the record;

Fig. 4 is a section on the line 4-4 of Fig. 3; and

Fig. 5 is a section on the line 5-5, Fig. 2. In all the views, like parts are designated by the same reference numerals.

The phonograph shown is of the Edison type and comprises the usual body 1 having a back rod 2 and a guide rod 3, on which rods the traveling carriage 4 is slidably

mounted. Pivotaly mounted on the front end of the carriage 4 is a frame 5 supporting a recorder 6 and a reproducer 7, the pivotal movement of this frame permitting either the recorder or the reproducer to be brought into operative position. Figs. 1 and 2 show the frame 5 in position for recording; and Fig. 3 shows the same in position for reproducing. The mandrel 8 is mounted on the main shaft 9 which is adapted to be driven from the pulley 10 when operatively connected thereto by the clutch 11. 12 represents a feed screw, which is adapted to be engaged by a nut mounted on the bottom of the traveling carriage to feed the carriage 4 along the record at the desired speed.

Referring to Figs. 1 and 2, my improved memorandum attachment therein shown comprises a frame 13 provided with a lower horizontal arm 14, an upper horizontal arm 15, and an outwardly extending horizontal arm 16 at right angles to the arms 14 and 15. The arm 14 engages the top 16 of the cabinet of the phonograph and is detachably secured thereto adjacent the left hand edge thereof by a plate 17. This plate is secured to the arm 14 and passes through a slot 18 (see Fig. 3) in the top of the cabinet to which last named part it is locked by the lever 19. This lever is pivoted to the cabinet and is provided with an extension adapted to engage the slot 21 in the plate 17. As it is customary to provide phonographs with the slot 18 and the locking lever 19 for securing the cover in place, the frame 13 can be applied to such machines without any change in the structure thereof. The arm 15 is provided with a horizontal slot 22 and has secured to its upper face a plurality of lugs 23 each pivotaly supporting a lever 24. Each of these levers has pivoted intermediate its ends an axially movable marking pin or punch 25 passing loosely through the upper part of the arm 15 into the slot 22. These pins and levers are normally held in an elevated position by coil springs 26 surrounding the pins and engaging at their ends the top of the arm 15 and shoulders 26' on the punches 25. A conical seat 25' is provided in the bottom of the slot 22 for each of the pins 25. 27 represents a flat tubular guide provided with flanges 28 whereby it is secured to the arm 15 in register with the



slot 22, and 29 a screw or equivalent bearing secured to the arm 16 and adapted to support a roll 30 of memorandum tape of paper or any other suitable indentable material. 5 29' are washers engaging the sides of the roll 30 to hold the same in place. The memorandum tape is passed through the guide 27 and the slot 22 and is detachably engaged with the pins 31 on the spring arm 32 which 10 is secured to the traveling carriage of the phonograph. Both the bearing 29 and the arm 32 thus serve as supports for the tape. In the operation of my device, the tape 30 is fed past the punches 25 at the same speed 15 as the recorder and reproducer are fed across the record. As shown in Figs. 1 and 2, these punches are located in a line at right angles to the line of motion of the memorandum tape and are mounted respectively above and 20 adapted to mark upon the various parts of the said tape corresponding to the parallel longitudinal instruction spaces shown between the wires 38 in Fig. 3.

In Figs. 3 and 4, I have shown a memorandum holder 33 preferably made of sheet 25 metal, and secured to and movable with the traveling carriage. This holder preferably comprises a lower sheet metal base 34 secured to the said carriage and an upper frame 35 30 secured at its front longitudinal edge to the base 34 and provided with two openings 36 and 37. The memorandum tape is adapted to be frictionally held between the base 34 and the frame 35, and in order to divide the 35 said tape into the desired instruction spaces, spaced wires 38 are run longitudinally across the openings 36 and 37 as shown in Fig. 3. A preferably transparent card or plate 39 is placed above the opening 37 to designate 40 the various longitudinal spaces. To indicate the part of the record to which the instructions indicated refer, an index 40 provided with a pointer 41 located adjacent to the opening 36 is secured to the cross rod 3. 45 In the operation of my device, the memorandum tape is fed past the punches 25 at a speed corresponding with that of the recorder. The dictator may, therefore, mark thereon any instructions desired relatively 50 to the various parts of the record by simply depressing the proper lever 24. When it is desired to transcribe the record, the transcriber places the tape in the holder 33 bringing it into the same position relatively 55 to the traveling carriage as it held when marked by the dictator. By bringing the pointer 41 to any desired mark on the tape, the part of the record to which the instructions corresponding to this mark refer can 60 be readily found.

While I have shown the preferred embodiment of my invention, it is to be understood that my invention is not limited thereto.

67 Having now described my invention what

I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. In a phonograph, a sound recording member and a sound record receiving member, said members being movable with respect to each other, a memorandum receiver in fixed relation with one of said members, and a recording mechanism in fixed relation with the other of said members, said 70 recording mechanism comprising a plurality of devices for indicating different instructions, together with means for operating said devices to cause the same to record upon said memorandum receiver to indicate 80 instructions at certain points on the sound record receiving member.

2. In a device of the class described, the combination with a phonograph, of movable tape supporting means connected with said 85 phonograph and adapted to impart to the tape a movement of translation with reference to the fixed parts of the phonograph, and marking means mounted in proximity to the path of the tape, substantially as described. 90

3. In a device of the class described, the combination with a phonograph having a rotatable record support, means for supporting a sound box, and means for producing a relative feeding movement between 95 said first named means and said record support, of a tape support connected with said first named means, substantially as described. 100

4. In a device of the class described, the combination with a phonograph having a rotatable record support, means for supporting a sound box, and means for producing a relative feeding movement between 105 said first named means and said record support, of a tape support connected with said first named means and adapted to impart to the tape a movement of translation with reference to said record support, and marking 110 means mounted in proximity to the path of the tape, substantially as described.

5. In a device of the class described, the combination with a phonograph having a rotatable record support, means for supporting a sound box, and means for producing a relative feeding movement between 115 said first named means and said record support, of a tape support connected with said first named means and adapted to move the 120 tape in the direction of the relative feeding movement between said first named means and said record support, and marking means immovable in the direction of movement of the tape mounted in proximity to the path 125 thereof, substantially as described.

6. In a device of the class described, the combination with a phonograph provided with a rotatable record support, of means 130 for supporting a roll of tape, and means



connected with said phonograph and movable thereby for imparting a movement of translation to the tape, substantially as described.

5 7. In a device of the class described, the combination with a phonograph provided with a rotatable record support, of a guide for a memorandum tape, and means connected with said phonograph and movable  
10 thereby for imparting a movement of translation to the memorandum tape through said guide, substantially as described.

8. In a device of the class described, the combination with a phonograph provided  
15 with a rotatable record support, of means for supporting a roll of tape, means movable by said phonograph for imparting a movement of translation to the tape, and marking means connected with said phono-  
20 graph and mounted in proximity to the path of the tape, substantially as described.

9. In a device of the class described, the combination with a phonograph provided with a rotatable record support, of a guide  
25 for a memorandum tape, means connected with and movable by said phonograph for moving the tape at a uniform speed through said guide and marking means mounted in proximity to the path of the tape, substan-  
30 tially as described.

10. In a device of the class described, the combination with a phonograph provided with a rotatable record support, of means  
35 for supporting a roll of memorandum tape, means movable to feed the tape in a direction at right angles to the direction of rotation of the record support, means for guiding the tape in such movement, and marking means mounted in proximity to  
40 the path of the tape, substantially as described.

11. In a device of the class described, the combination with a phonograph having a rotatable record support, means for sup-  
45 porting a sound box, and means for producing a relative feeding movement between said first named means and said record support, of a tape support connected with said first named means and adapted  
50 to be moved thereby at a speed corresponding with that of the relative feeding movement between said first named means and said record support, substantially as described.

12. In a device of the class described, the combination with a sound record support-  
55 ing member and a sound recording member in operative relation thereto, said members being movable with respect to each other, of a memorandum device comprising a memorandum receiver, and means for re-  
60 cording on said receiver to indicate transversely of the same a plurality of different instructions, said memorandum receiver and recording means being movable with re-

spect to each other to permit said recording means to record upon said memorandum receiver instructions for certain points on a record carried by said record support, substantially as described.

13. In a device of the class described, the combination with a sound record support-  
70 ing member and a sound recording member in operative relation thereto, said members being movable with respect to each other, of a memorandum device comprising  
75 a memorandum receiver, and recording means comprising a plurality of devices for indicating different instructions on said memorandum receiver, said memorandum  
80 receiver and recording means being movable with respect to each other to permit said devices to record upon said memorandum receiver instructions for certain points  
85 on a record carried by said record support, substantially as described.

14. In a device of the class described, the combination with a sound record support-  
ing member and a sound recording member in operative relation thereto, said members  
90 being movable with respect to each other, a memorandum receiver in fixed relation to one of said members, and a recording mechanism in fixed relation with the other of  
95 said members, said recording mechanism being arranged to indicate transversely of said memorandum receiver different instructions for certain points on a record  
carried by said record support, substan-  
tially as described.

15. In a device of the class described, the combination with a sound record supporting  
100 member and a sound recording member in operative relation thereto, said members being movable with respect to each other, of a memorandum device comprising a memo-  
105 randum receiver, and recording means comprising a plurality of punches for indicating different instructions on said memorandum receiver, said memorandum receiver  
110 and recording means being movable with respect to each other to permit said punches to record upon said memorandum receiver instructions for certain points on a record  
115 carried by said record support, substantially as described.

16. In a device of the class described, the combination with a sound record supporting  
120 member and a sound recording member in operative relation thereto, said members being movable with respect to each other, of a memorandum device comprising a memo-  
125 randum receiver, and recording means comprising a plurality of axially movable devices for indicating different instructions on said memorandum receiver, said memorandum  
130 receiver and recording means being movable with respect to each other to permit said axially movable devices to record upon said memorandum receiver instructions



for certain points on a record carried by said record support, substantially as described.

17. In a device of the class described, the  
5 combination with a sound record supporting member and a sound recording member in operative relation thereto, said members being movable with respect to each other, of  
10 a memorandum device comprising a memorandum receiver, recording means comprising a plurality of devices for indicating different instructions on said memorandum receiver, said memorandum receiver and  
15 recording means being movable with respect to each other to permit said devices to record upon said memorandum receiver instructions for certain points on a record carried by said record support, and means tending to retain each of said devices in inoperative position, substantially as described.

18. In a device of the class described, the  
combination with a sound record supporting member and a sound recording member in operative relation thereto, said members  
25 being movable with respect to each other, of a memorandum device comprising a memorandum receiver, and recording means for indicating instructions in different parallel lines extending longitudinally of said receiver, said memorandum receiver and recording means being movable with respect

to each other to permit said recording means to record upon said memorandum receiver instructions for certain points on a record carried by said record support, substantially  
35 as described.

19. In a device of the class described, a sound recording member and a sound record receiving member, said members, being movable with respect to each other, a guide for  
40 a memorandum tape in fixed relation with one of said members, and means connected with the other of said members and movable thereby for imparting movement to the memorandum tape through said guide, substantially as described.

20. In a device of the class described, a sound recording member and a sound record receiving member, said members being movable with respect to each other, tape supporting means, means movable by one of  
50 said members for imparting movement to the tape, and marking means in fixed relation to the other of said members and in proximity to the path of the tape, substantially as described.

This specification signed and witnessed  
this 15th day of February, 1911.

ALEXANDER N. PIERMAN.

Witnesses:

FREDERICK BACHMANN,  
ANNA R. KLEHM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

TONE PURIFIER,  
 #1,231,277-----Charles P. Marshall,  
 Patented-June 26th, 1917.  
 Filed-November 23rd, 1916.

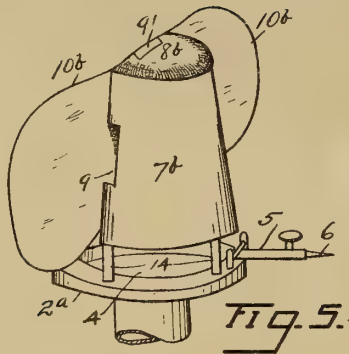
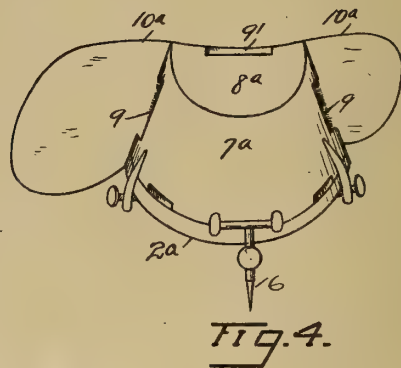
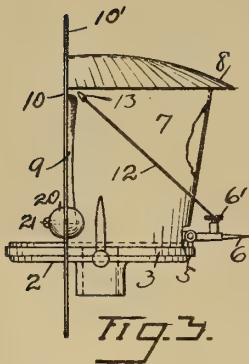
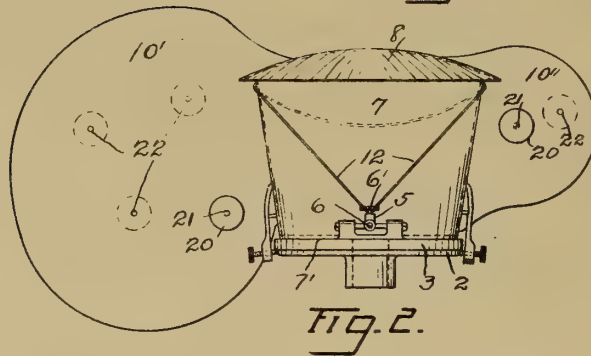
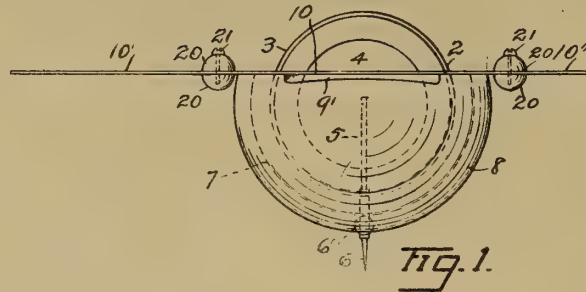
C. P. MARSHALL.  
TONE PURIFIER.

APPLICATION FILED NOV. 23, 1916.

1,231,277.

Patented June 26, 1917.

2 SHEETS—SHEET 1.



WITNESS  
*Walter L. Fay.*

INVENTOR.  
CHARLES P. MARSHALL.  
BY *Harry D. Wallace*  
ATTORNEY

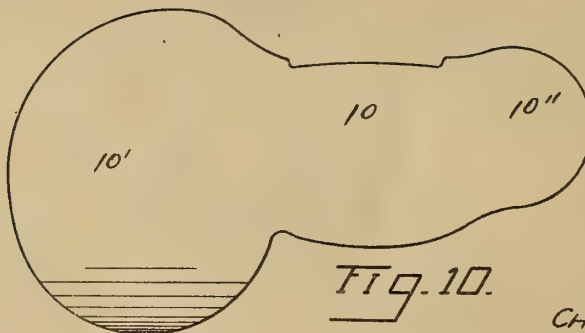
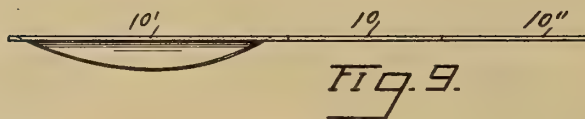
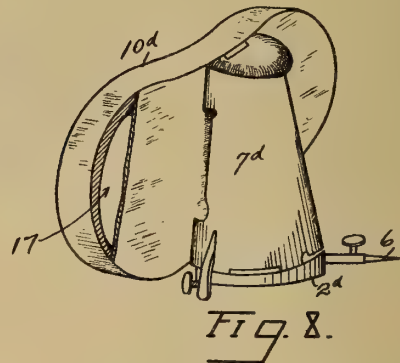
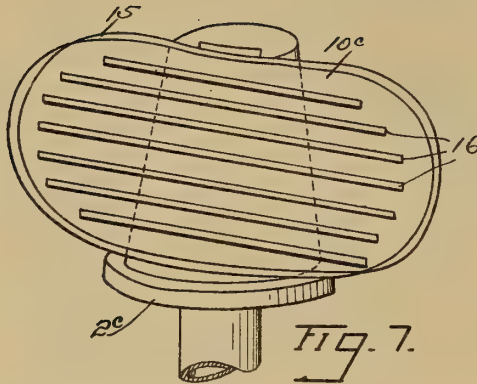
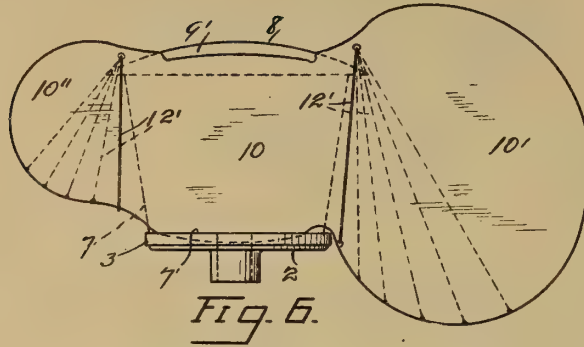




C. P. MARSHALL.  
TONE PURIFIER.  
APPLICATION FILED NOV. 23, 1916.

1,231,277.

Patented June 26, 1917.  
2 SHEETS—SHEET 2.



WITNESS  
*Walter L. Fay.*

BY

INVENTOR.  
CHARLES P. MARSHALL  
*Harry Dorrance*  
ATTORNEY

# UNITED STATES PATENT OFFICE.

CHARLES P. MARSHALL, OF WATERTOWN, NEW YORK.

## — TONE-PURIFIER. —

1,231,277.

Specification of Letters Patent.

Patented June 26, 1917.

Application filed November 23, 1916. Serial No. 133,074.

*To all whom it may concern:*

Be it known that I, CHARLES P. MARSHALL, a citizen of the United States, residing at Watertown, in the county of Jefferson and State of New York, have invented certain new and useful Improvements in Tone-Purifiers, of which the following is a specification.

This invention relates to tone purifiers designed for phonographs, talking machines and the like.

The invention relates particularly to improvements in the class of devices shown and described in my United States Patent No. 1199197, dated September 26, 1916.

The principal object of the present invention is to increase the symphonic quality and degree and to improve the acoustic quality and degree of tone purifiers of the class. A further object is to provide a hollow resonator or acoustic chamber substantially in the form of a truncated cone having one flat side. A further object is to extend the flat side of the resonator more or less in one or more directions, for varying the symphonic quality and degree of the purifier. A further object is to provide various shaped tone and sound modifying openings in different parts of the body for varying the degree and quality of tone and sound. A further object is to provide a dome top for the body which may vary in size and shape, for improving the acoustic and also the symphonic quality and degree of the purifier. And a further object is to provide sound modifying tension cords or snares which may be applied to either the body or the wings.

I attain these objects by the means set forth in the detailed description which follows, and as illustrated in the accompanying drawings, in which—

Figure 1 is a top plan-view of the purifier embodying my improvements. Fig. 2 is a front side elevation of the same mounted upon a well-known reproducer. Fig. 3 is an end elevation of the same. Fig. 4 is a modified view showing the extended wings and flat top. Fig. 5 is a modified view showing the purifier attached to the reproducer by means of legs. Fig. 6 is a rear side elevation of the device shown in Figs. 1, 2 and 3; showing a plurality of tension cords. Fig. 7 is another modification showing ribs mounted on the sounding board. Fig. 8 is still another modification showing a dome

top and a hollow sounding board. Figs. 9 and 10 are respectively a top plan and a side elevation of a modified sounding board.

In the drawings, 2 represents generally the reproducer of a talking machine, including the annular rim 3, the diaphragm 4, the vibration bar 5, and the needle 6, all of which parts may be of the usual style or make.

7 represents the hollow resonator comprising the body of the tone purifier, having one open end 7', which faces the diaphragm 4 and rests upon or engages the rim 3. The body 7 is preferably larger at its top than at its bottom, and its top end is closed by a dome 8, whose eaves preferably extend beyond the walls of the body, as shown in Figs. 1, 2, 3 and 6. The domes, however, may extend more or less beyond the bodies, for varying the quality and degree of resonance. The domes are employed particularly for more perfectly focusing the reflected resonated sound waves upon the diaphragm. 9 represents a number of tone and sound modifying openings, which may be disposed in different parts of the hollow body 7, but these openings are preferably positioned at the opposite sides, as at the intersection of the body with the flat side 10, as well as at the rear extremity of the dome 8, as shown at 9'. In the present case, the flat side 10 is preferably continued in opposite directions beyond the body or bell 7, for providing wings or planes, as 10'—10'', preferably of unequal size and varying shapes. By thus extending the flat side or sounding board of the resonator, the symphonic quality and degree of the instrument is varied, thereby rendering the reproductions of the records more clear and perfect than heretofore. The wings 10'—10'' may be arranged in the same plane as the flat portion 10, or they may be curved or otherwise bent, as shown in Figs. 9 and 10. This curving of the wings tends to steady the whole sound board, thus controlling the vibrations to a better degree and giving to the tones added clarity and brilliancy. The bell or body 7 is preferably in direct and positive contact with the rim 3 of the sound box or transmitter 2, so that the vibrations of the said rim are communicated to the bell, and particularly to the flat side 10 and the wings 10'—10'', where the vibrations are symphoniously propagated, after which they are resonated by the acoustic properties



of the hollow body 7. The tones and sounds of the instrument are still further improved as to clarity and tone color by providing one or more tension cords as 12—12', which  
 5 are applied to the body, as well as to different parts of the extended sounding board. These tension cords may consist of any suitable material, but they are preferably made in whole or in part of flexible or elastic material. In Figs. 2 and 6 are shown a number  
 10 of the tension cords applied to the different parts of the body 7, as well as to the wings 10'—10''. The cords 12 are preferably detachably applied to the set screw 6', which  
 15 holds the needle in place, the ends of the said cords preferably being secured to the body 7 by links or clips 13, as shown in Fig. 3. The cords 12', when at rest are preferably positioned as shown in full lines  
 20 in Fig. 6, and are capable of being set in a number of different positions, as shown by the dotted lines in Fig. 6. Each different position into which the cords are placed has a different modifying effect. These tension  
 25 cords tend to steady both the vibration bar and the resonator, as well as the wings 10'—10''. The principal function of the cords 12 and 12' is to restrain the vibrations of the parts and thereby vary the symphonic and acoustic resonance, producing various  
 30 pleasing qualities of clarity and tone color.

In Fig. 4 is shown a relatively large bell shaped resonator 7<sup>a</sup>, having a flat top 8<sup>a</sup> and an elongated laterally extended sounding  
 35 board 10<sup>a</sup>.

In Fig. 5 is shown a smaller conical resonator 7<sup>b</sup> having a small dome top 8<sup>b</sup> without eaves and a relatively short sounding board 10<sup>b</sup>. In this view the resonator is  
 40 shown supported on the transmitter 2<sup>a</sup> by means of legs 14. I find that to apply my resonator to certain makes of reproducers it is necessary to provide the legs referred to. Besides by thus restricting the metallic  
 45 connection between the resonator and the casing 2<sup>a</sup> materially modifies or changes the purifying effect.

In Fig. 7 is shown a flat top resonator to which is applied a modified sounding board  
 50 10<sup>c</sup>, wherein the extended wings are substantially the same size and shape, and in which I provide tone and sound modifying rim 15 and bars 16, which vary the quality and degree of resonance.

In Fig. 8 is shown a resonator or bell 7<sup>d</sup> having a dome top 8<sup>d</sup>, which slightly overhangs the walls of the bell, and a tone or sound modifying chamber 17 arranged within the extended sounding board 10<sup>d</sup>, for still  
 60 further varying the quality and degree of resonance.

In Figs. 1 and 2 are shown rubber or other tone modifying masses or weights 20, which are preferably fastened to the wings 10'—10''  
 65 by screws 21, the latter passing through

perforations 22 in said wings. The masses 20 may be disposed in different positions on the wings, as indicated by dotted lines in Fig. 2 for giving rigidity to and steadying  
 70 the different portions of said wings. By the use of the masses 20 the vibrations of the different portions of the sounding board 10'—10'' may be varied—restrained, for modifying the symphonic quality and degree of the tones and sounds. 75

In operation, the vibrations of the needle 6 are transmitted to the diaphragm 4 and from the diaphragm into the casing of the sound-box of the reproducer 2, the latter transmitting them into the walls of the purifier 7. Thus the vibrations permeate the entire structure of the purifier and are symphoniously propagated largely throughout the extended flat side, and also throughout the extended top or dome 8, they are then  
 80 resonated by the acoustic properties of the purifier 7 and reflected on to the diaphragm, which receives them and transmits them as improved, purified tones and sounds, synchronously with the regular tones and  
 90 sounds of the diaphragm. This results in the tones and sounds in the music and speech being enriched, strengthened and purified by being multiplied and given a wider range to spread and develop through-  
 95 out the ample size of the extended flat side and also by the improved acoustic quality of the purifier, particularly the enlarged top of the part 7, as herein shown and described. Furthermore, by this improvement the tones  
 100 are enriched by largely overcoming or "coloring" the raw nasal note of the diaphragm by the increased, rich, fundamental tone of the purifier. Improved articulation and enunciation are effected by the improved  
 105 acoustic qualities of the purifier, which is attained by the peculiar proportioning of the body 7, and by better focusing the reflected sounds, upon the diaphragm, by means of the dome 8, as well as by the provision and arrangement of the various  
 110 "speaking" openings 9 and 9'.

Having thus described my invention, what I claim is new and desire to secure by Letters Patent, is— 115

1. A tone purifier comprising a hollow body having one open end and one closed end, the closed end comprising a dome having projecting eaves, and a sounding board comprising one side of said body and having wings extending laterally beyond said body. 120

2. A tone purifier comprising a hollow body having one open end and one closed end, the closed end comprising a dome having projecting eaves, and a sounding board comprising one side of said body and having wings of unequal size extending laterally beyond said body. 125

3. A tone purifier comprising a hollow 130

body having a reduced open end and an enlarged closed end formed dome-shaped, a sounding board comprising one side of said body having wings extending laterally beyond said body, and a plurality of tension cords secured to said body and also to said wings.

4. A combined acoustic and symphonic tone purifier, comprising a hollow body having one flat side comprising a sounding board, the ends of said board extending laterally beyond the body, and said body having tone and sound modifying openings adjacent said wings.

5. A combined acoustic and symphonic tone purifier comprising a hollow body having an extended dome-shaped top and sound modifying openings, and a sounding board comprising one side of said body and having wings extending laterally beyond said body.

6. A tone purifier comprising a hollow body having one flat side which extends in opposite directions beyond the body, said body having an extended dome-shaped top and tone-and-sound modifying openings positioned at the intersection of the body with the flat side.

7. The combination with the diaphragm and the casing of a reproducer, of a symphonic resonator comprising an extended sounding board, and a body supporting and conducting the vibrations from the casing to the sounding board, said body having an acoustic chamber receiving sound waves from the diaphragm.

8. The combination with a reproducer including a diaphragm, of a symphonic resonator comprising an extended sound board, and a hollow body supporting said sound board having an acoustic chamber provided

with a dome top adapted to focus sound waves upon the diaphragm.

9. The combination with a reproducer including a casing, a diaphragm and a needle bar, of a hollow body, the lower end thereof being open and engaging said casing, the upper end of said body closed by a dome, a sounding board disposed at one side of said body having wings extending laterally from said body, and said body having a plurality of sound-modifying openings disposed at the intersection of the body and the sounding board.

10. The combination with a reproducer of a hollow body having a contracted lower end engaging the reproducer, its top end being enlarged and surmounted by a dome, one side of said body being flat and provided with laterally extending wings, and said body having a plurality of tone and sound-modifying openings disposed at the intersection of the body with said wings and between the dome and the said flat side.

11. The combination with a reproducer comprising a casing and a diaphragm, of the hollow body having an open end in engagement with said casing and facing said diaphragm, the top of said body being enlarged and dome-shaped, and an elongated sounding board supported by said body and having wings extending laterally in opposite directions beyond said body.

12. A tone purifier consisting of a hollow acoustic body having one flat side comprising a sounding board, the ends of said board extending laterally beyond the body, and a plurality of sound and tone modifying masses mounted on the said sounding board.

In testimony whereof I affix my signature.

CHARLES P. MARSHALL.



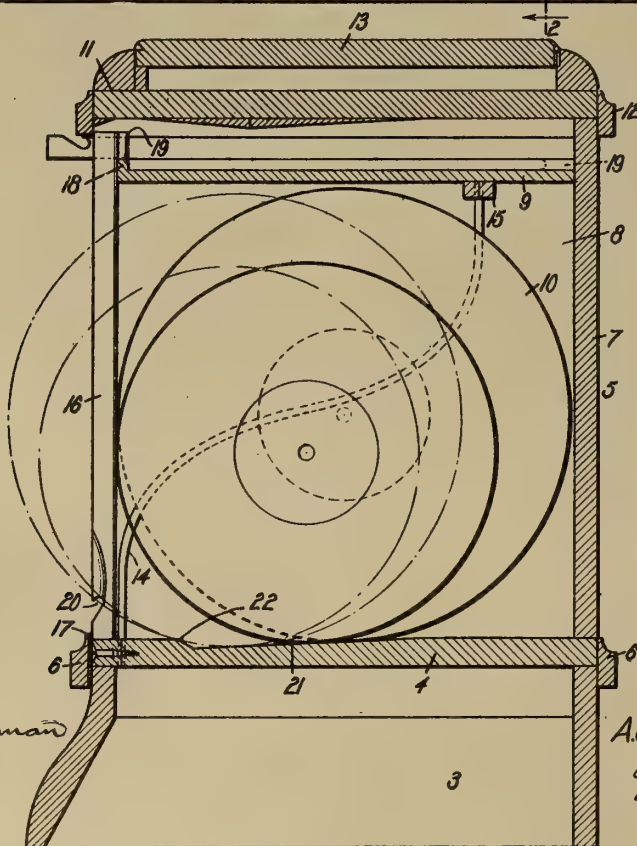




FILING-CABINET FOR DISK RECORDS,  
#1,231,326-----Andrew Bolton,  
Patented-June 26th, 1917.  
Filed-February 11th, 1916.

**1,231,326.**

Fig. 1.



WITNESSES  
 Chas. H. Libman  
 Bloff

INVENTOR  
A.C. Bolton  
Munn Co  
ATTORNEYS

# UNITED STATES PATENT OFFICE.

ANDREW CHARLES BOLTON, OF BROOKLYN, NEW YORK.

FILING-CABINET FOR DISK RECORDS.

1,231,326.

Specification of Letters Patent. Patented June 26, 1917.

Application filed February 11, 1916. Serial No. 77,622.

*To all whom it may concern:*

Be it known that I, ANDREW C. BOLTON, a citizen of the United States, and a resident of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Filing-Cabinet for Disk Records, of which the following is a full, clear, and exact description.

My invention relates to the sectional type of cabinets for disk records. An object of the invention is to provide a simple and inexpensive cabinet in which records of various sizes can be filed simultaneously, and which records are easily accessible independent of their size. Another object of the invention is to provide a cabinet for disk records which will present a portion of the disk out of the cabinet when the access-giving-means to the cabinet are operated. A further object of the invention is to provide a cabinet in which any record in the cabinet may be exposed without exposing the other records in the cabinet.

With the above and other objects in view, the nature of which will more fully appear as the description proceeds, the invention consists in the novel construction, combination and arrangement of parts as herein fully described, illustrated and claimed. In the accompanying drawings, forming part of the application, similar characters of reference indicate corresponding parts in both views.

Figure 1 is an elevation of a cabinet embodying my invention, a view of the access-giving-means being shown in the raised position; and

Fig. 2 is a vertical section on line 2-2, Fig. 1.

Referring to the drawings, 3 is a top, open, rectangularly-shaped base of a cabinet on which a bottom 4 of a section 5 of the cabinet rests. The bottom 4 has a depending molding 6 at the edges thereof for engaging the base to prevent the section 5 from moving on the base. The rear walls 7 and the side walls 8 of the cabinet are braced at the upper edges by a false top 9 depressed below the upper edges but spaced sufficiently from the bottom to accommodate between said false top and the bottom disks 10 of largest size. When only one section is used, a removable top 11 rests on the edges of the rear and side walls in place of the bottom of any other section. The top has

a depending molding 12 at the edges thereof, similar to the bottom of a section, to prevent the displacement of the top on the section. The top 11 forms a shallow casing for which a hinged cover 13 is provided. This casing may be used for classifying the various records filed in the cabinet.

The space between the side walls 8 of the section 5 is partitioned by wire members 14. One end of each wire is secured in the bottom 4 adjacent the front of the section and the other, in a brace 15 secured to the false top 9 adjacent the rear wall. The distance between the adjacent wires 14 is such as to admit only a single record. Each of the wires is preferably covered with soft material so as to prevent injury to the disks. It is self-evident that if desired partition walls may be provided in lieu of the wires.

Each of the disk spaces is closed in front by a slide or shutter 16, consequently, the front of the cabinet is formed of a series of independent slides or shutters. Each slide when closing a disk space has its upper end engaged between the front edge of the false bottom 9 and the front molding 12 of the top 11. A clearance is provided between the upper extremity of the slide 16 and the top 11 to permit the lower extremity of the slide to be raised above the portion 17 of the front molding 6, the portion 17 locking the slide in closed position.

To expose a disk space a slide must be raised to clear the raised portion 17 of the molding 6. It can then be turned on a bead 18 provided on the false top 9 at the front of the section and moved into the space between the top 11 and the false top 9, the space therebetween being sufficient to accommodate the slide 16. A toe 19 is provided on each slide to prevent the slide from being withdrawn from between the top 11 and the false top 9 and to retain the slide in a substantially horizontal position on the false top, as shown in full line in Fig. 2. To facilitate the operation of the slides, each has a hook-shaped cut-out 20 to facilitate an upward movement thereof. Each slide above the cut-out 20 is reduced to facilitate the engagement thereof by the fingers when the adjacent slides are in closed position.

To maintain disks of various sizes against the corresponding slides 16 the bottom 4 has a forwardly inclined portion 21 on which the edges of all the disks rest, and which incline causes said disks to bear with their



edges against the slides 16. If a slide against which a disk bears is raised and moved into the position as shown in full line in Fig. 2, the incline will cause the said disk to roll forward until stopped by the obstruction formed by the edge 22 on the bottom. Thus, a portion of a disk is exposed, as shown in dotted line in Fig. 2, and the same can be easily removed from the space in the section.

From the above description it will be seen that in my cabinet the access-giving-means, that is, the slide 16, normally maintain the disks on the incline of the bottom whereon the disks have a tendency to roll through a predetermined distance.

I claim:

1. In a cabinet for disk records, means normally tending to roll the disk to expose a part thereof out of the cabinet, and access-giving-means adapted to engage the edge of the disks, at a point lying on a substantially horizontal radial line and resist their rolling movement.

2. In a cabinet, an inclined bottom for causing the disks placed edgewise thereupon to roll toward the front of the cabinet, and access-giving-means to said cabinet adapted to engage the edges of the disks when in closed position at a point lying on a substantially horizontal radial line, thereby normally preventing the rolling of said disks on the bottom, said bottom having means preventing said disks from rolling off the bottom when the access-giving-means are displaced to give access to the cabinet.

3. In a cabinet for disk records, means normally tending to present a part of a record out of the cabinet, and access-giving-means to the cabinet normally preventing said first-mentioned means from advancing a record out of the cabinet.

4. In a cabinet for disk records, a bottom having a forwardly inclined part for receiving disks edgewise thereupon, means subdividing said cabinet into spaces for individual disks, and a closing front formed of independent closing members for each individual space, each of said closing members adapted to engage the edge of a record within the space resting on the incline, said incline adapted to normally present a portion of a disk out of the space when the closing members are displaced from the front of the cabinet.

5. In a cabinet for disk records, a bottom having a forward incline for receiving disks edgewise thereupon, a false top spaced from the top of the cabinet, means between the bottom and the false top subdividing the cabinet into individual spaces, each adapted to receive a record, a front for said cabinet formed of slides, one for each individual space, and adapted to engage the edge of a disk within the space, means at the bottom for locking the slides against lateral movement, said slides adapted to be placed in the space between the false top and the top of the cabinet to expose any of the individual spaces whereby a record in an exposed space will be caused by the incline to roll forward and expose a part thereof, substantially as and for the purpose set forth.

6. In a cabinet for disk records, a bottom having a forwardly-inclined part for receiving disks edgewise, said incline normally tending to cause the disk placed thereupon to roll forward to expose a part thereof out of the cabinet, a false top spaced from the top of the cabinet, wires extending from the bottom of the cabinet to the false top thereof and subdividing the cabinet into individual spaces, a front for the cabinet formed of independent slides, one for each individual space, each of said slides being adapted to engage a disk within the space and each of said slides adapted to turn about the front edge of the false top when moving said slide into the space between the false top and the top of the cabinet, and means in the front of the cabinet at the bottom thereof normally preventing the turning movement of the slides, said slides having a predetermined limiting movement toward the top of the cabinet to clear the same of the means at the bottom, and whereby a slide can be moved from its normal position into the space between the false top and the top of the cabinet and whereby a disk placed on the incline of the bottom is allowed to roll to expose a part thereof out of the cabinet, substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ANDREW CHARLES BOLTON.

Witnesses:

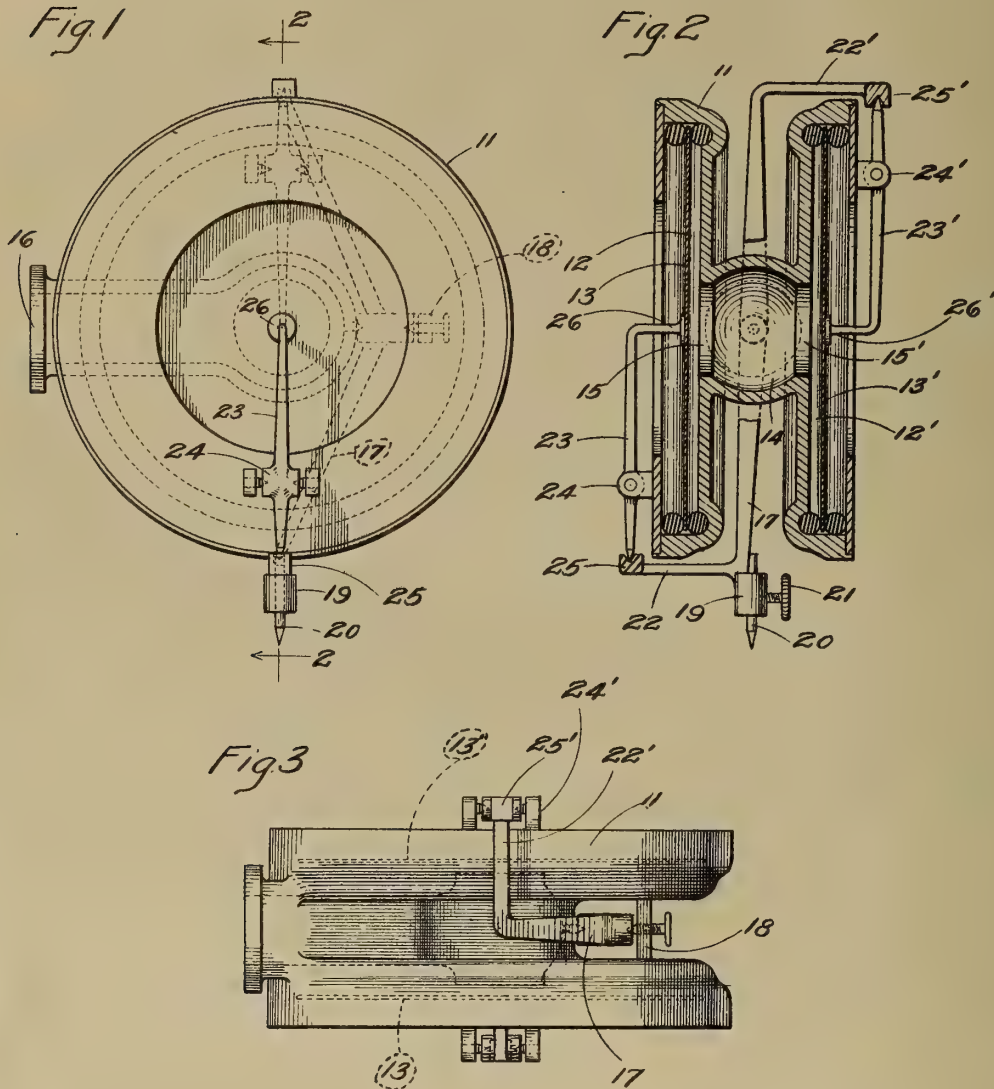
CHARLES UNGRICH,  
B. W. FINKEN.

PHONOGRAPH REPRODUCER,  
#1,231,329-----Forest Cheney,  
Patented-June 26th, 1917.  
Filed-October 6th, 1913.

F. CHENEY.  
 PHONOGRAPH REPRODUCER.  
 APPLICATION FILED OCT. 6, 1913.

1,231,329.

Patented June 26, 1917.  
 2 SHEETS—SHEET 1.



Witnesses:  
*C. Burnap*  
*Henry A. Parks*

Inventor:  
*Forest Cheney*  
 By *Sheridan Wilkinson & Scott* Attys

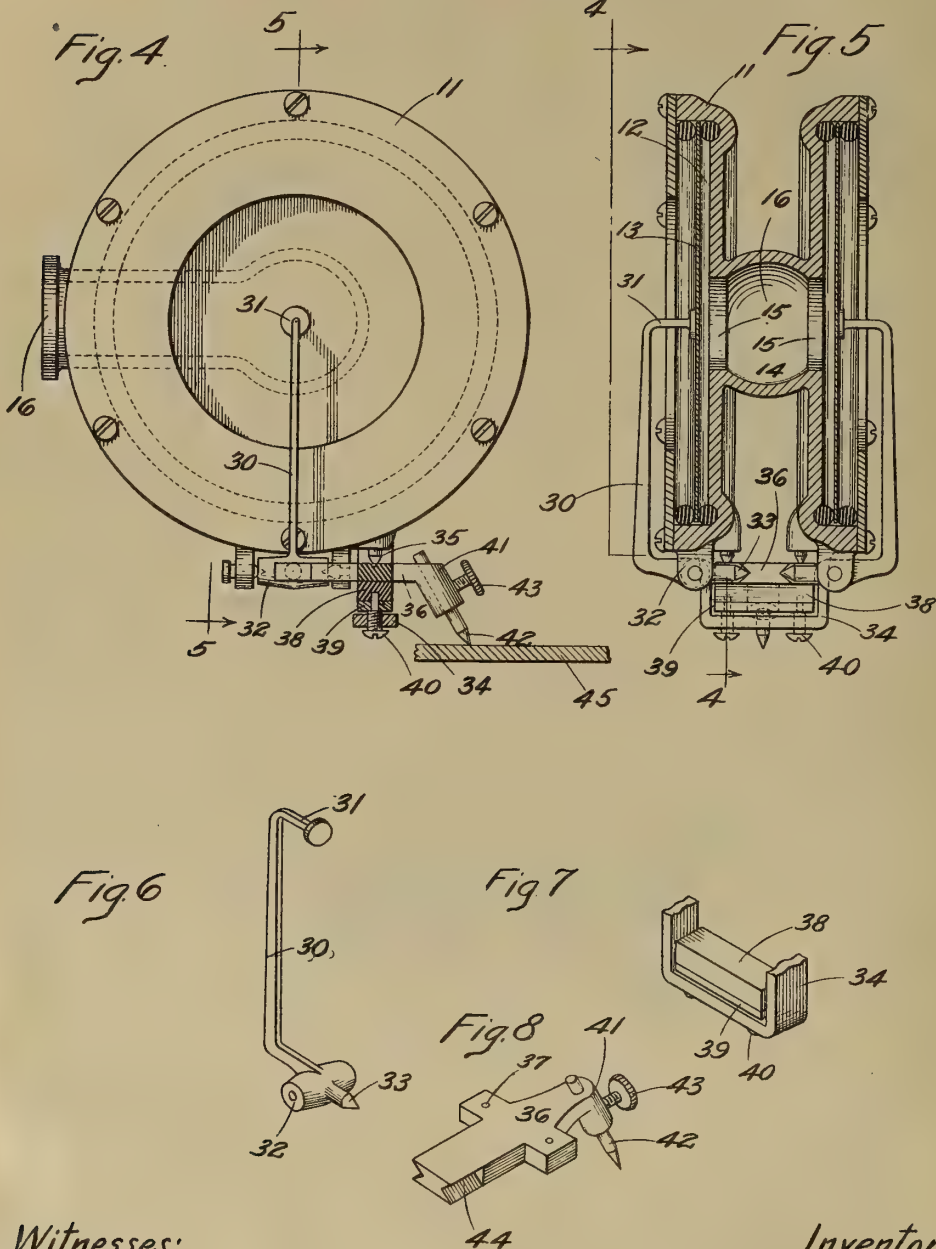




F. CHENEY.  
 PHONOGRAPH REPRODUCER.  
 APPLICATION FILED OCT. 6, 1913.

1,231,329.

Patented June 26, 1917.  
 2 SHEETS—SHEET 2.



Witnesses:  
*C. Burnap*  
*Henry A. Parks*

By  
*Sheridan, Wilkinson & Scott*

Inventor:  
*Forest Cheney*  
 Attys

# UNITED STATES PATENT OFFICE.

FOREST CHENEY, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO CHENEY TALKING MACHINE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

## PHONOGRAPH-REPRODUCER.

1,231,329.

Specification of Letters Patent. Patented June 26, 1917.

Application filed October 6, 1913. Serial No. 793,746.

*To all whom it may concern:*

Be it known that I, FOREST CHENEY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Phonograph-Rep-  
5 ducers, of which the following is a specification.

The principal object of my invention is to provide a new and improved device for  
10 reproducing sound from a record. Another object of my invention is to provide a phonograph reproducer with two diaphragms working oppositely to one another so as to  
15 give an increased intensity in the reproduction of the sound from a record. Another object of my invention is to provide mechanism for transmitting the vibrations of a reproducer stylus to two diaphragms to vi-  
20 brate the latter in opposition to one another. All these objects and others will be explained and made clear in the following specification and claims, taken with the accompanying drawings in which I have illus-  
25 trated two specific embodiments of my invention; it will be understood that the invention is defined in the appended claims. I now proceed to describe the two specific embodiments, which as I have stated, are  
30 shown in the drawings.

Figure 1 is an elevation.

Fig. 2 is a vertical section on the line 2 of Fig. 1 looking in the direction of the  
arrows.

35 Fig. 3 is a top plan view.

Fig. 4 is an elevation with the lower part in section of the second form of my device.

Fig. 5 is a vertical section taken on the line 5, 5 of Fig. 4 looking in the direction  
40 of the arrows.

Figs. 6, 7 and 8 are perspective views of fragmentary details.

Referring to the embodiment of my invention depicted in Figs. 1, 2 and 3, the cas-  
45 ing 11 carries two diaphragms 13 and 13' with the respective chambers 12 and 12' behind them both opening through the passages 15 and 15' into the single central chamber 14 which leads through the con-  
50 duit 16 to the sound amplifying horn not shown in the drawings.

The lever 17 has an intermediate fulcrum with pivot points supported on the bar 18 and opposite thereto, the point carried by

the bar 18 being made adjustable. At its  
55 lower end lever 17 has a sleeve 19 carrying the needle 20 adapted to be secured therein by the set screw 21. Also at its lower end the lever 17 has a laterally extending arm  
22 at the extremity of which is a pin and  
60 socket connection 25 to the lever 23 fulcrumed at 24. The upper end of the lever 23 is connected at 26 to the center of the diaphragm 13.

At its upper end the lever 17 has an off-  
65 set arm 22' (opposite to 22) which connects through a pin and socket joint 25' with the lever 23' fulcrumed at 24' and connected at 26' with the diaphragm 13'.

It will be seen that as the stylus 20 is  
70 vibrated by the record, the lever 17 will be oscillated about its intermediate fulcrum and this movement will be transmitted in opposite directions through the two levers  
23 and 23' to the diaphragms 13 and 13'.  
75 Thus the two diaphragms 13 and 13' will move away from one another in unison and toward one another in unison so that they will act together to produce condensations  
and rarefactions of the air within the cham-  
80 bers 12 and 12' and the intermediate connecting chamber 14.

Thus it will be seen that the sound trans-  
mitted from the vibrations of the stylus 20  
will be augmented, reinforced, or intensified.  
85

Referring now to the embodiment of my invention shown in Figs. 4 to 8, inclusive, this has a shell or casing 11 with the diaphragms 13 mounted therein similar to the form shown in Figs. 1, 2 and 3. While  
90 the vibration transmitting mechanism is different in structure, its effect is the same. On each side there is a lever 30 with its upper end 31 attached to the respective diaphragm  
13. Each lever 30 is pivoted intermediately  
95 at 32 and its other end consists of a point 33, the two points 33 on the two levers 30 being directed toward each other, as shown in Fig. 5. The yoke 34 depends from the casing 11 and above this yoke 34 are two  
100 downwardly directed pivot points 35, which engage corresponding sockets 37 in the short lever 36 shown in perspective in Fig. 8. Underneath the lever 36 is a cushion 38 of rubber, beneath which is a metal plate 39 held  
105 by the shouldered screws 40 in the yoke 34.

One end of the lever 36 has a sleeve or collar 41 which carries an obliquely direct-



ed stylus 42 secured by the set screw 43. The other end of the lever 36 has V-section grooves 44 on its sides which engage respectively with the points 33 that terminate the  
5 levers 30.

In the particular embodiment of my invention shown in Figs. 4 to 8, I have shown the stylus 42 inclined to the surface of the record 45; it being assumed in this instance  
10 that the record is one embodying a combined "hill and dale" cut and a "zig-zag" cut.

It will also be seen that in the embodiment of Figs. 4 to 8, the lever 36 is held in en-  
15 gagement with the pivot points 35 by means of pressure transmitted through the cushion 38. The degree of this pressure is adjustable by means of the screws 40. This feature is not claimed in this application.

It will be seen that a vibration of the point of the stylus 42 results in an up and down oscillation of the end of the lever 36 carrying the grooves 44. This up and down vibration is transmitted to the points 33,  
20 and thereby through the levers 30 opposite vibrations are imparted to the diaphragms 13. The effect is the same as for the form of my invention illustrated in Figs. 1, 2 and 3.

30 I claim:

1. In a sound reproducer, two parallel diaphragms with adjacent chambers between them connected to a common sound outlet, a stylus, and mechanism from the  
35 stylus to the diaphragms to make the latter vibrate oppositely.

2. In a sound reproducer, two parallel diaphragms with adjacent chambers between them connected to a common sound  
40 outlet, levers connected to said diaphragms on their outer sides, a stylus, and connec-

tions from the stylus to said levers to vibrate the diaphragms oppositely.

3. In a sound reproducer, two parallel diaphragms, a stylus below the same, a lever carrying the said stylus, two additional  
45 levers pivotally and directly connected to the first mentioned lever and also connected respectively to the two diaphragms, and a common sound outlet leading from both of  
50 said diaphragms.

4. In a sound reproducer, two parallel diaphragms, two pivotally mounted levers arranged oppositely adjacent the outer sides of said diaphragms, an actuating lever hav-  
55 ing a pin and socket connection with each of said levers, and a stylus mounted on said actuating lever.

5. In a sound reproducer, two parallel diaphragms, two pivoted levers normally  
60 disposed in parallel planes and each connected to one of said diaphragms, an actuating lever carrying a stylus and directly connected to each of said levers whereby  
65 said diaphragms are moved toward or away from each other simultaneously, and a common sound outlet leading from both of said diaphragms.

6. In a sound reproducer, two parallel diaphragms, levers connected to said diaphragms on their outer sides, an actuating lever having oppositely directed angularly  
70 disposed ends, each pivotally connected to one of said first named levers, and a stylus carried by said actuating lever.

In testimony whereof, I have subscribed my name.

FOREST CHENEY.

Witnesses:

GEO. L. WILKINSON,  
EDYTHE M. ANDERSON.

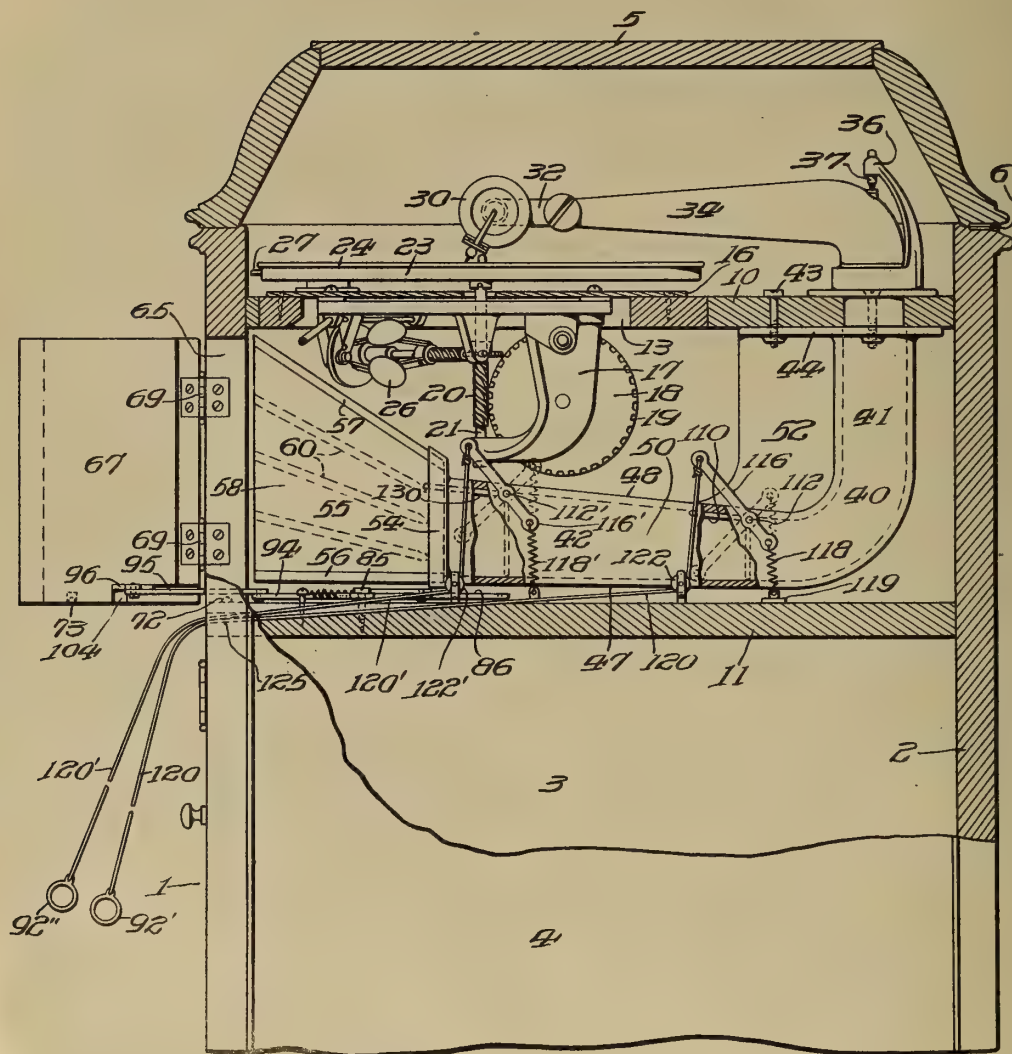
TONE-MODULATING DEVICE FOR  
TALKING-MACHINES,

#1,231,370-----Eldridge R. Johnson,  
Patented-June 26th, 1917.  
Filed-December 14th, 1914.

1,231,370.

3 SHEETS—SHEET 1.

*Fig. 1.*



**WITNESSES**

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George K. Hebard

BY

Hutton & Brown-

## ATTORNEYS



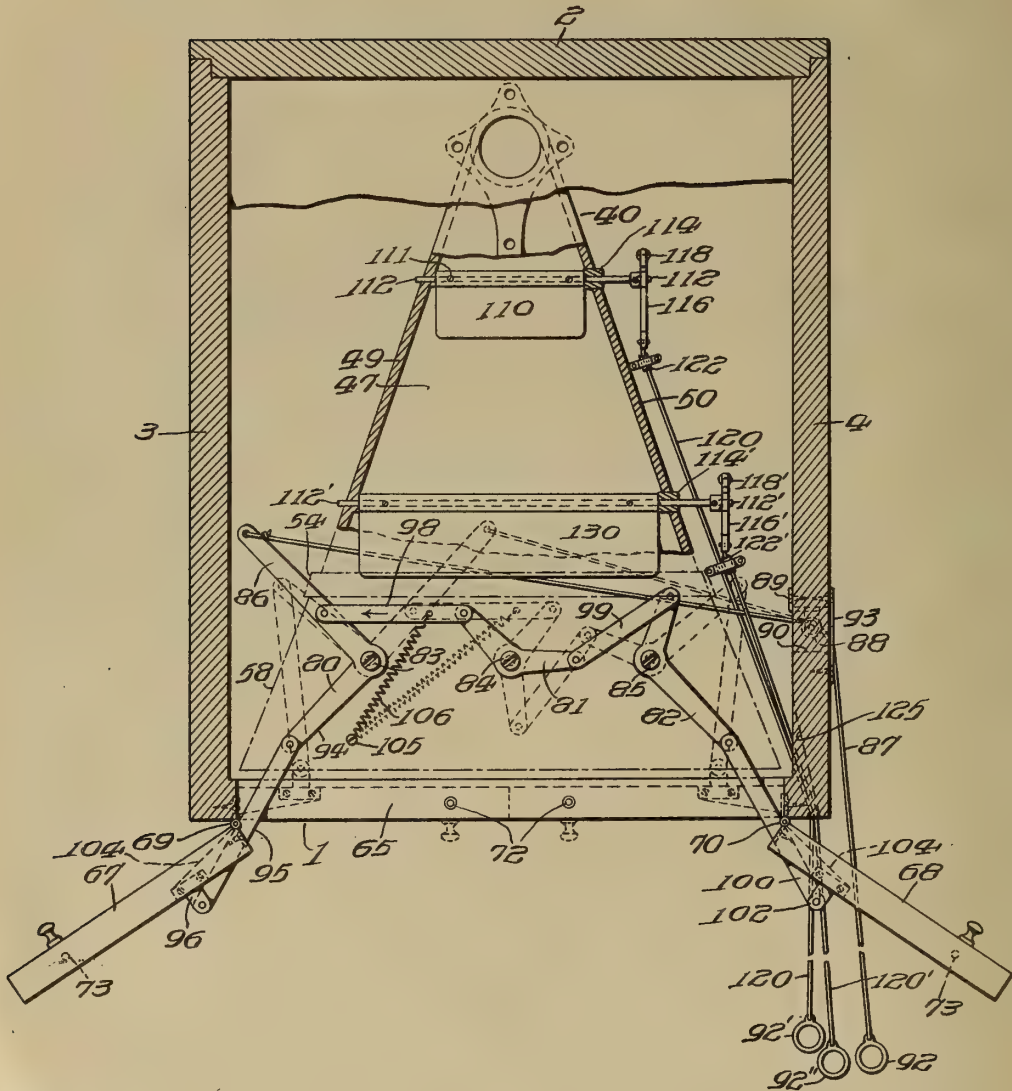


E. R. JOHNSON.  
TONE MODULATING DEVICE FOR TALKING MACHINES.  
APPLICATION FILED DEC. 14, 1914.

1,231,370.

Patented June 26, 1917.  
3 SHEETS—SHEET 2.

Fig. 2.



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George K. Helak.

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1,231,370.

3 SHEETS—SHEET 3.

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F. J. Hartman.  
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Scutou & Blount

**ATTORNEYS**

# UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF MERION, PENNSYLVANIA, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

tone-MODULATING DEVICE FOR TALKING-MACHINES.

1,231,370.

Specification of Letters Patent.

Patented June 26, 1917.

Application filed December 14, 1914. Serial No. 877,049.

*To all whom it may concern:*

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of Merion, county of Montgomery, and State of Pennsylvania, have invented certain new and useful Improvements in Tone-Modulating Devices for Talking-Machines, of which the following is a specification, reference being had to the accompanying drawings.

Among the principal objects of my invention are to provide means whereby the sound waves projected from a talking machine during the reproduction of sound may be modulated, controlled and varied; to provide means whereby such sound waves may be modulated, controlled and varied by a person located at any desired distance from the talking machine, and which shall consist of but a small number of parts of simple design and construction. Further objects of my invention are to provide tone modulating means which may be utilized or not as desired; which when not in use, will in no way affect or hamper the reproduction of sound by the machine, and which will in no way injure the appearance or beauty thereof, or render the same unsightly.

Further objects of my invention are to provide means selective in their nature whereby the sound waves projected from a talking machine during the reproduction of sound may be modulated, varied or controlled, said means being capable of selective as well as conjoint operation, either at a distance from the talking machine or adjacent thereto in such manner as to produce substantially any desired tone effect or modulation.

My invention also includes all of the other various novel objects and features of construction and arrangement hereinafter more definitely specified.

In the accompanying drawings, Figure 1 is a vertical longitudinal section through a talking machine embodying one form of my invention, certain parts being shown in elevation for the sake of clearness, and Figs. 2 and 3 are transverse horizontal sections thereof, showing certain parts of the device in various different positions assumed during the operation thereof.

While various embodiments of the invention may be readily employed in connection with talking machines of different forms,

the talking machine which I have illustrated in the drawings comprises a cabinet having a front wall 1, back wall 2, side walls 3 and 4, and a lid 5 suitably hinged to the back wall at 6. The cabinet may be interiorly provided with transverse horizontal partitions 10 and 11, the former having a suitable aperture 13 for the reception of the actuating means or motor which may be of any suitable or preferred construction, the same forming no part of my invention. The motor shown in the drawings comprises a plate 16 secured to the partition 10 and extending over the aperture 13 from which is suitably suspended a bracket 17 supporting the spring barrel 18 having suitable gearing 19 meshing with a worm 20 upon the vertical shaft 21 journaled at its lower end and extending upwardly through the plate to support the usual turntable 23 on which may be placed a sound record 24. The motor may also be provided with governing means 26 which may be of any desired form, and with braking means 27.

The sound reproducing means 30, also of any suitable or preferred construction and located above the turntable in the usual manner, may be pivotally connected by means of a U-shaped tube 32 to the usual, preferably tapering, tone arm 34 extending toward the rear of the cabinet and supported adjacent its larger and downwardly turned end by any suitable means, such for instance as the bracket 36 and pivot 37, so as to render it freely movable in a horizontal plane.

The downwardly turned end of the tone arm may be arranged to communicate with the sound conveyer 40 located beneath the partition 10 and suitably secured thereto as by bolts 43 extending through the partition and through a suitable horizontal flange 44 preferably integral with the sound conveyer, so that the sound conveyer is supported entirely from the partition. If desired, however, any other method of attachment or support may be utilized. The sound conveyer may comprise an upwardly extending portion 41 preferably substantially circular in cross section, and a substantially horizontal portion 42 preferably substantially rectangular in cross section and having a substantially horizontal bottom wall 47, a slightly upwardly divergent top wall 48 and sharply outwardly divergent side



walls 49 and 50, the whole sound conveyer being preferably formed of metal and, if desired, being provided with a vertical integral web 52 for the purpose of strengthening the construction to render it more rigid and resistant to vibration. Peripherally around the larger end of the sound conveyer may be located a suitable flange 54 adapted for the reception of one end of the amplifier 55 secured within the flange in any desired manner, and comprising a substantially horizontal bottom 56, an upwardly divergent top 57 and outwardly divergent side walls 58, the angular divergence of the latter being substantially similar to the angular divergence of the walls 49 and 50 of the sound conveyer, and the angular divergence of the top 57 being preferably considerably greater than that of the top 47 thereof. The amplifier may be formed of wood or other suitable material and, if desired, may be provided with a plurality of suitable interior partitions or sounding boards 60. The amplifier preferably terminates adjacent to, but not in contact with, the front wall 1 of the cabinet which is provided with a preferably rectangular opening or aperture 65, substantially coextensive with the mouth of the amplifier, through which the sound waves issuing therefrom are permitted to pass out of the cabinet, and which may be provided with a pair of suitable closures or doors 67 and 68 hinged to the wall of the cabinet by hinges 69 and 70, a pair of catches 72 comprising upwardly spring-pressed balls or other suitable means adapted for engagement within apertures 73 in the edges of the doors serving to hold the latter in closed position, as shown in the dotted lines in Fig. 2, when desired.

As is well known, the position of the doors with relation to the mouth of the amplifier materially affects the volume of sound issuing therefrom, the loudest reproduction being obtained with the doors in extreme open position, as shown in solid lines in Fig. 2, and the most muffled when the doors are fully closed, as shown in dotted lines in that figure, a proportionate volume of sound being obtained when the doors are in positions intermediate of these extremes. For the purpose, therefore, of controlling the position of the doors from a point either at a distance from the talking machine or adjacent thereto, I make use of certain combinations of parts and instrumentalities, and in the form of the invention illustrated, the same may consist of a plurality of bell-crank levers 80, 81 and 82 pivoted respectively upon suitable stationary pivots 83, 84 and 85 secured to the partition 11. One arm 86 of the bell-crank 80 extends substantially toward the rear of the cabinet and has attached to it a suitable cord or chain 87 pass-

ing diagonally across the top of the partition 11 and over a pulley 88 mounted upon a bracket 89 secured in fixed relation with the cabinet, and preferably positioned within a suitable aperture 90 formed in the wall thereof. From thence the cord 87 passes without the cabinet and extends for any desired distance as, for instance, across the room in which the machine is located, a ring 92 or other suitable device being preferably provided at its end to afford a convenient hold for the hand of the operator. If desired, a suitable escutcheon plate 93 may be attached to the exterior of the cabinet over the aperture 90 to form a finish therefor, the plate being provided with a suitable opening through which the cord 87 may pass.

The other arm 94 of the bell-crank 80 is pivotally attached to a suitable link 95 in turn pivotally attached to a suitable bracket 96 secured to the inside of the door 67, and at a point substantially midway of the length of the arm 86 may be pivotally attached another suitable link 98 connecting said arm with the end of one arm of the bell-crank 81, the end of the other arm of this crank being similarly pivotally connected by the link 99 with the end of one arm of the bell-crank 82. The end of the other arm of the crank 82 is pivotally connected by a link 100 with a bracket 102 upon the door 68, in a manner similar to that already described in connection with the door 67. A suitable recess 104 may be provided adjacent the lower inner edge of each door in order to prevent the links 95 and 100 from striking against the corners of the doors during the opening movement and thus preventing them from assuming the fully opened position shown in Fig. 2, the recesses permitting the links to pass beyond the planes of the inner surfaces of the doors for this purpose. In certain constructions, however, the recess might be omitted and the links so shaped that the doors could assume a fully opened position without the links striking against the inner corners of the doors.

Suitably positioned in the partition 11 is a stud 105 to which is attached one end of the coil spring 106, the other end being secured at a suitable point upon the link 98. This spring is so proportioned as to be always under some tension no matter what the position of the link 98, the tension being at a minimum when the doors are fully opened, as shown in solid lines in Fig. 2, and at a maximum when the doors are fully closed, as shown in dotted lines in that figure. The various parts are so positioned and arranged and the lengths of the links and of the arms of the bell-cranks are so proportioned, that the tendency of the spring will always be to pull the link 98 in



the direction of the arrow, thereby forcing the long arm of the bell-crank 80 in a similar direction and pushing the link 95 outwardly to open the door 67 to the limit of its movement, a similar pressure being constantly exerted on the door 68 through the action of the other bell-cranks and their adjacent links. It will be readily perceived, however, that the tendency of the spring to open the doors outwardly may be counteracted by a sufficient pull upon the cord 87 so that by suitable manipulation of the cord the doors may be made to assume any desired position from the extreme limit of outward movement, as shown in Fig. 2 in solid lines, through any number of intermediate positions, as shown in Fig. 3, to closed position as shown in the former figure in dotted lines, in which latter position the doors will remain without any tension upon the cord 87 by reason of the action of the spring catches 72 hereinbefore referred to, which are so arranged as to hold the doors in closed position against the pull of the spring 106.

It will be further understood that the various bell-cranks and links, as well as the spring 106 hereinbefore referred to, are preferably positioned adjacent the upper surface of the partition 11 and between it and the bottom of the amplifier and sound conveyer, which are spaced sufficiently far from the surface of the partition to permit the free operation of the various parts, as clearly shown in Fig. 1.

While it is possible by proper manipulation of the cord 87 to cause the doors to assume various positions to vary and control the volume of sound issuing from the amplifier, a somewhat more perfect tone modulation may be attained when the doors are manipulated in conjunction with certain other means, preferably located within the sound conveyer itself, and which may preferably comprise a plurality of shutters movably positioned within the sound conveyer in such manner that their relation to the sound passage may be controlled from the exterior of the machine, preferably from the same point from which the position of the doors is controlled, and while these shutters may be formed and actuated in various manners, I prefer to employ shutters constructed substantially as follows: The shutter 110 is preferably positioned within the sound conveyer adjacent the upturned portion 41 thereof, and comprises the shutter proper formed preferably of a plate of suitable metal or other material and rigidly secured, as by screws 111, to a suitable shaft 112 journaled in the sides of the sound conveyer which, if desired, may be provided with a bushing 114 to provide a suitable bearing for the shaft. The shaft may project a considerable distance beyond the

sound conveyer, preferably toward that side of the cabinet upon which the pulley 90 is secured, and a suitable lever 116 may be fixedly secured to the shaft by a set screw or other suitable means. To one end of the lever may be attached a suitable coil spring 118, the other end of which is secured to a lug 119 on the surface of the partition 11. A suitable cord or chain 120 is attached to the other end of the lever, from which point it passes downwardly under a pulley 122 mounted upon a bracket secured to the partition 11 and from thence diagonally toward the corner of the cabinet, and passing through a suitable opening 125 in the wall thereof, extends outwardly therefrom for any desired distance, the length of the cord outside of the cabinet being preferably substantially the same as the cord 87, so that the operation of the two cords may be carried on from the same point. A ring 92' may be attached to the end of the cord.

It will be evident that the spring 118 will normally tend to draw the adjacent end of the lever 116 downwardly, thus serving to turn the shutter 110 upwardly to a position substantially parallel with the top of the amplifier, the shaft 112 being preferably positioned at a point in the side walls of the sound conveyer just below the under surface of the top 48. When, however, the cord 120 is pulled, the other end of the lever will be depressed and the spring extended, whereby the shutter may be caused to assume any position between fully opened, as shown in solid lines in Fig. 1, and fully closed, as shown in dotted lines therein, thus changing the shape and restricting the area of the passage in the sound conveyer through which the sound waves must pass, the shape of the shutter being preferably substantially that of the cross section of the sound conveyer adjacent thereto, so that when the shutter is in closed position the passage through the sound conveyer will be completely obstructed, which, however, does not serve to entirely muffle the reproduction of sound by the machine.

For the purpose of obtaining the fullest possible control over, and modulation of, the sound waves and for obtaining the most artistic and pleasing effects, I prefer to position a second shutter 130 substantially adjacent the mouth of the sound conveyer and directly behind the amplifier. While the size of this shutter will necessarily be somewhat greater than that of the shutter 110 in order that it may substantially close the passage in the sound conveyer when depressed, the construction and arrangement of the shutter and of its operating mechanism, may preferably be substantially similar to that already described in connection with the shutter 110, the shutter being attached to a shaft 112', journaled in the



walls of the conveyer, which may be suitably provided with a proper bushing 114' and operated through the medium of lever 116' by cord 120' passing over pulley 122' and thence through opening 125 to any desired point, preferably adjacent the end of cords 120 and 87. A ring 92'' may be provided on the end of the cord, and a spring 118' attached to one end of the lever 116' serves to normally keep the shutter in raised position against the top of the sound conveyer from which position it may be caused to move by pulling upon the cord 120'.

It will thus be evident that I have provided means by the operation of which the tone and volume of the sound waves issuing from the mouth of the amplifier when the talking machine is in operation may be modulated and varied as may be desired, and from a point either adjacent to or at a distance from the machine. Furthermore, it may be stated that if during the reproduction of any given selection the shutter 110, for instance, is operated alone, and then the selection repeated and shutter 130 operated alone, and the same procedure be again gone through and the doors alone operated, quite different effects may be obtained in each instance, a result for which I do not attempt to account, but by reason of which it is possible by a proper manipulation of the several cords conjointly to obtain the most varied and complete tone modulations.

While I have herein illustrated and described one form of my invention with considerable detail, I do not desire to be understood as thereby limiting myself specifically thereto, as it will be evident that various changes and alterations may be made in the construction and arrangement of the several parts of the device without departing from the spirit and scope of the invention as defined in the appended claims.

Having thus described my invention, I claim and desire to protect by Letters Patent of the United States:

1. In a talking machine, the combination of a cabinet having an opening, movable closures for said opening, a sound conveyer having a passage, a sound amplifier between said sound conveyer and said opening, means movable within said sound conveyer operative to restrict the area of said passage, and means operative to control the position of said closures and of said first mentioned means from a point at a distance from said cabinet.

2. In a talking machine, the combination of a cabinet having an opening, sound reproducing means, an amplifier terminating adjacent said opening, sound conveying means having an internal passage and connecting said sound reproducing means and said amplifier, movable closures for said opening, a plurality of means within said sound con-

veyer operative to restrict the area of said passage, means operative to control the position of said closures from a point removed from said cabinet, and means operative to control said means within said sound conveyer from the same point.

3. In a talking machine, the combination of a cabinet having an opening, sound reproducing means, a sound amplifier, a sound conveyer having an internal passage and connecting said sound amplifier and said sound reproducing means, a pair of movable doors for said opening, a plurality of movable shutters within said passage, means operative to control the position of said doors from a point removed from said cabinet, and means operative to control the position of said shutters from the same point.

4. In a talking machine, the combination of a cabinet having an opening, sound reproducing means, sound conveying means connecting said sound reproducing means with an amplifier terminating adjacent said opening, a pair of movable doors for said opening, means tending to normally maintain said doors in open position, a plurality of shutters within said sound conveying means, means operative to normally maintain said shutters in open position, and means operative to change the position of said doors and of said shutters from a point removed from said cabinet.

5. In a talking machine, the combination of a cabinet having an opening, sound reproducing means, an amplifier terminating adjacent said opening, a sound conveyer connecting said amplifier and said sound reproducing means, a pair of movable closures for said opening, a plurality of shutters in said sound conveying means, means comprising a plurality of spring-actuated levers operative to normally maintain said closures in open position, means comprising spring-actuated levers operative to normally maintain said shutters adjacent the wall of said sound conveyer, and means operative to change the position of said closures and of said shutters from a point distant from said cabinet.

6. In a talking machine, the combination of a cabinet having an opening, sound reproducing means, an amplifier terminating adjacent said opening, sound conveying means interposed between said amplifier and said sound reproducing means, a pair of hinged doors adjacent said opening, a plurality of rotatable shutters within said sound conveyer, spring-actuated means without said sound conveyer normally operative to maintain said shutters adjacent the top wall thereof, means comprising a plurality of spring-actuated bell-crank levers operative to normally maintain said doors in open position, and a plurality of cords extending from said aforesaid means and through

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the wall of said cabinet whereby the position of said doors and of said shutters may be varied.

7. In a talking machine, the combination  
5 with a cabinet having an opening, of movable closures for said opening, means comprising a plurality of bell-crank levers and a spring operative to normally maintain  
10 said closures in open position, and means comprising a cord extending through the wall of said cabinet operative to actuate said first-mentioned means whereby the position  
of said closures may be varied.

8. In a talking machine, the combination  
15 with a cabinet, of a sound conveyer within said cabinet, a plurality of rotatable shutters within said sound conveyer, means without said sound conveyer and within said cabinet operative to normally maintain said  
20 shutters in one position, and means extending without said cabinet whereby said shutters may be caused to assume another position.

9. In a talking machine, the combination  
25 with a cabinet having an opening and a pair of movable closures for said opening, of a sound conveyer supported within said cabinet, a pair of rotatable shutters within said sound conveyer, means whereby the position  
30 of said closures may be changed from a point removed from said cabinet, and means whereby said shutters may be rotated from the same point.

10. In a talking machine, the combination  
35 with a cabinet having an opening and a pair of movable closures adjacent said opening, of a sound conveyer within said cabinet, means within said cabinet operative to normally maintain said closures in open position, a plurality of movable shutters within  
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said sound conveyer, means without said sound conveyer and within said cabinet operative to normally maintain said shutters in open position, and means extending  
45 through the wall of said cabinet whereby the position of said closures and of said shutters may be selectively altered from a point removed from said cabinet.

11. In a talking machine, the combination  
50 with a cabinet having an opening, of a pair of hinged doors adjacent said opening, means tending to maintain said doors in fully opened position, means operative to maintain said doors in closed position, a  
55 sound conveyer, a plurality of rotatable shutters in said sound conveyer, and selective means extending through the wall of said cabinet whereby the position of said doors may be controlled and said shutters  
60 rotated from a point distant from said cabinet.

12. In a talking machine, the combination  
of a cabinet having an opening, means operative to close said opening, a sound conveyer having a passage, a sound amplifier  
65 between said sound conveyer and said opening, means movable in said sound conveyer operative to restrict the area of said passage, and means operative to control the positions of said first-mentioned means and of  
70 said last-mentioned means from a point at a distance from said cabinet.

In witness whereof, I have hereunto set my hand this 9th day of December, A. D. 1914.

ELDRIDGE R. JOHNSON.

Witnesses:

HARRY COBB KENNEDY,  
CHARLES F. WILLARD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





DRIVING MECHANISM FOR TALKING-MACHINES,  
#1,231,431-----Hellmuth Rosenbaum,  
Patented-June 26th, 1917.  
Filed-January 30th, 1917.

H. ROSENBAUM.  
DRIVING MECHANISM FOR TALKING MACHINES.  
APPLICATION FILED OCT. 21, 1916.

1,231,431.

Patented June 26, 1917.

2 SHEETS—SHEET 1.

Fig. 2.

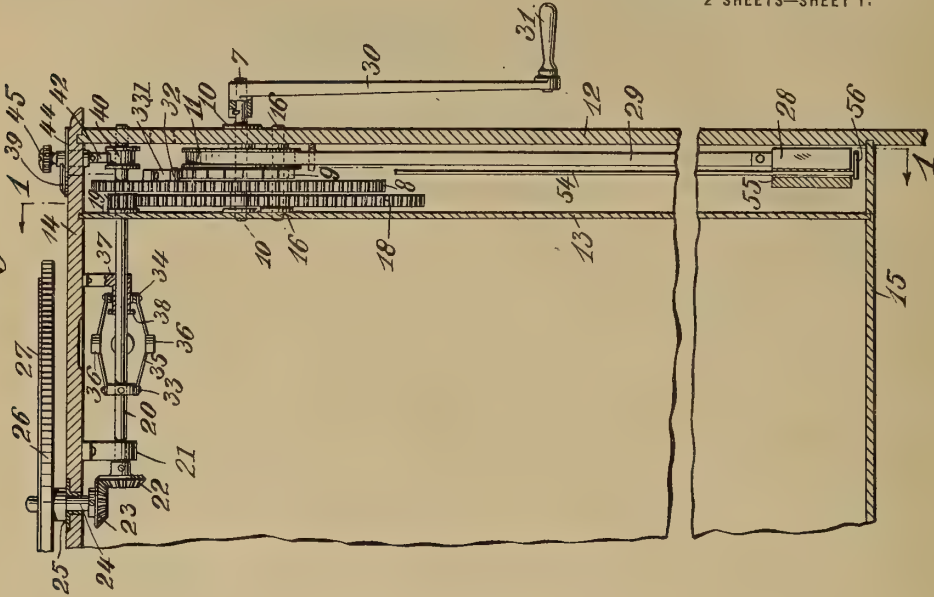
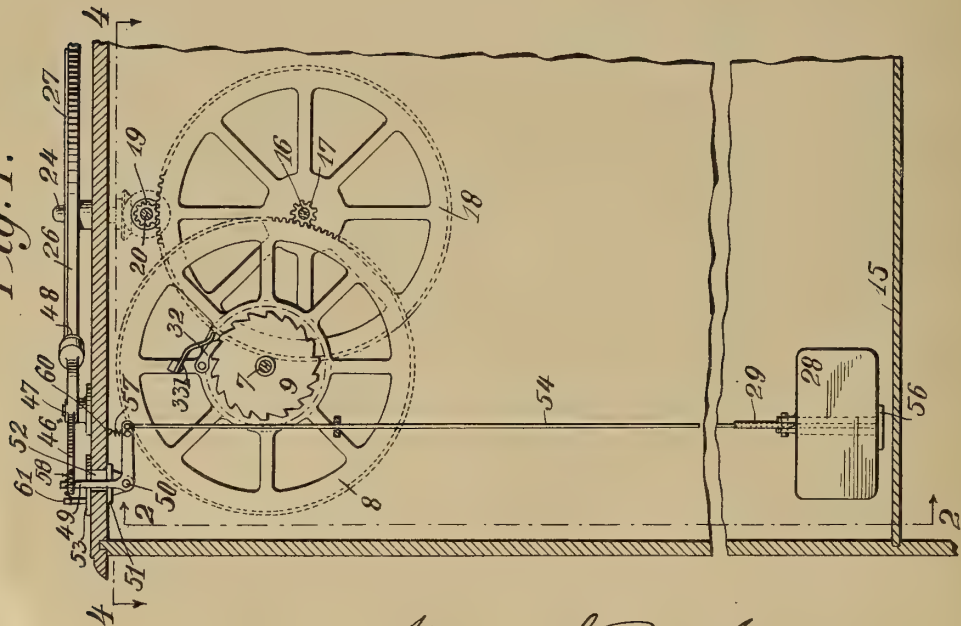


Fig. 1.



Witnesses:

Fred. Roeger.  
Louise Keller.

Hellmuth Rosenbaum, Inventor

By Henry Schruiter his Attorney



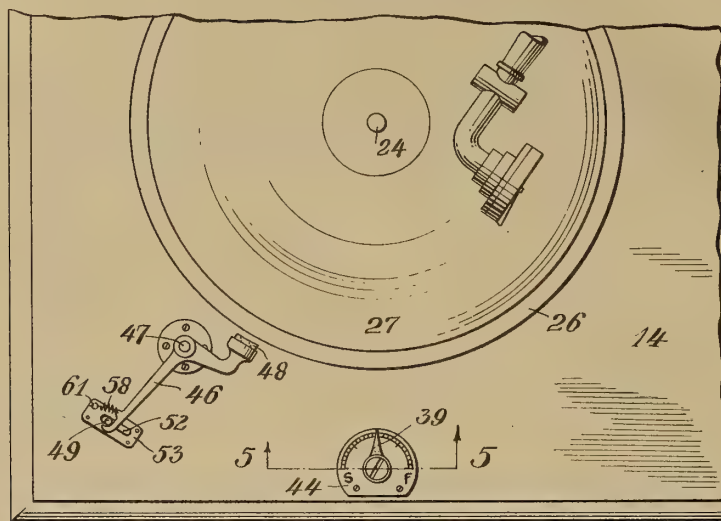


H. ROSENBAUM.  
DRIVING MECHANISM FOR TALKING MACHINES.  
APPLICATION FILED OCT. 21, 1916.

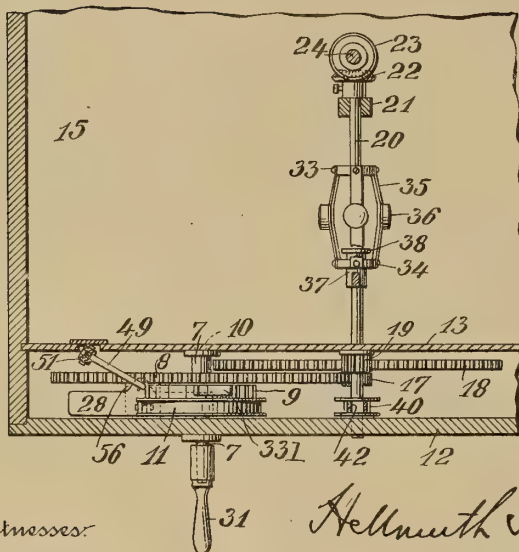
1,231,431.

Patented June 26, 1917.  
2 SHEETS—SHEET 2.

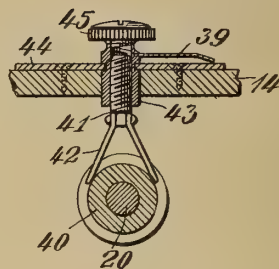
*Fig. 3.*



*Fig. 4.*



*Fig. 5.*



Witnesses:  
Fred. Korger.  
Louise Keller.

Henry Rosenbaum, Inventor  
By Henry Schreier, his Attorney

# UNITED STATES PATENT OFFICE.

HELLMUTH ROSENBAUM, OF BROOKLYN, NEW YORK.

DRIVING MECHANISM FOR TALKING-MACHINES.

1,231,431.

Specification of Letters Patent.

Patented June 26, 1917.

Application filed October 21, 1916. Serial No. 126,986.

*To all whom it may concern:*

Be it known that I, HELLMUTH ROSENBAUM, a citizen of Germany, and resident of the borough of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Driving Mechanisms for Talking-Machines, of which the following is a full, clear, and complete specification, reference being had to the accompanying drawings, wherein—

Figure 1 is a sectional view on line 1—1, indicated in Fig. 2, showing the driving mechanism in front elevation;

Fig. 2 is a sectional view on line 2—2, indicated in Fig. 1, showing the driving mechanism in side elevation;

Fig. 3 is a fractional top view of a talking machine;

Fig. 4 is a sectional view on line 4—4, indicated in Fig. 1, and showing a top view of the driving mechanism;

Fig. 5 is a fractional sectional view on line 5—5, indicated in Fig. 3, detail (drawn on an enlarged scale) showing the indicator, and the braking mechanism combined therewith.

The spring actuated mechanisms for driving the record disk of a talking machine are subject to the defect, that notwithstanding the means provided for regulating the speed, there is always a variation in the speed, resulting from the variation in the propulsive force of the spring, which the regulating devices are not capable of overcoming. By reason thereof the speed of the disk is noticeably greater at the start and correspondingly diminished toward the end, as the spring is more and more unwound. While this variation of speed does not very seriously affect the reproduction of the ordinary songs or musical renditions, the reproductions of finer instrumental music, for instance, instrumental solos, are detrimentally affected thereby.

The object of my invention is to eliminate this defect, and to provide a driving mechanism having a constant speed, slower or faster, as the mechanism may be adjusted, from the start to the end. The further object of my invention is to provide a driving mechanism for talking machines, which is more capable of being regulated according to the requirements of the song or musical composition, or instrumental rendition. To this end, my inven-

tion consists of the driving mechanism, in which a suspended weight is utilized for its motive force, and means are provided for maintaining a constant speed, whether slower or faster, as the rendition of a song, or of instrumental music, may require.

Referring to the drawings, illustrating an embodiment of my invention, the numeral 7 designates the main shaft, whereon a gear-wheel 8 is loosely mounted, the tape or rope pulley 11, and the ratchet wheel 9, being fixed thereto. Shaft 7 is journaled in bearings 10, provided in, or affixed to, one in the front wall 12, and the other in the partition wall 13, of the box of the talking machine, the two walls, in conjunction with the top plate 14 and the bottom plate 15, forming a casing, in which the driving mechanism is inclosed. An intermediate shaft 16 is similarly mounted in bearings set also in the front wall 12 and the partition wall 13 of the box of the machine, and the pinion 17, meshing with the cog-wheel 8, and the cog-wheel 18 meshing with the pinion 19, are fixed thereto. Pinion 19 is fixed to the driven shaft 20, having one end mounted in a bearing set in the front wall 12 of the machine, and the other, inner end, in the bearing 21 secured to the top plate 14 of the machine, as shown in Fig. 2. A bevel gear 22 is affixed to this inner end of the shaft 20. This gear meshes with the bevel gear 23, fixed to the inwardly projecting end of the stud or vertical shaft 24, rotatably mounted in the bearing 25, fixed in the top plate 14 of the box of the machine. The plate 26, supporting the record disk 27 is affixed to the upwardly projecting end of the stud 24, and means are provided for fixing the record plate thereon.

The weight 28, actuating the driving mechanism is connected by tape 29 with the pulley 11, and a crank 30, having a handle 31 affixed to its free end, is fitted upon the squared end of the shaft 7 to enable this shaft to be turned so as to raise the weight 28 preparatory to starting the driving mechanism in action. Instead of squaring the end of shaft 7, and providing a corresponding bore in the hub of the crank 30, the shaft may be left round and a pin set thereon to engage with a recess or cam, provided on the hub of the crank 30, to enable the shaft 7 to be rotated by moving the crank in one direction, *id est*, when the tape 29 is to be wound up on the pulley 11,



and to permit its reverse rotating when the weight 28 is unwinding the tape in driving the mechanism, while the crank 30 stands still.

5 The ratchet wheel 9 with the pawl 32, pivoted to the cog-wheel 8, and pressed against the ratchet wheel 9 by the spring 331, constitute the coupling, whereby the cog-wheel 8 is made to rotate with the shaft 7, when the driving mechanism operates, as hereinbefore explained. This cog-wheel 8 meshes with the pinion 17 fixed on the shaft 16, whereon also the cog-wheel 18 is fixed. The latter meshes with the pinion 19, 15 fixed on the driving shaft 20, and thereby this driving shaft is rotated. The bevel gear 22, meshing with the bevel gear 23, transmits this rotary motion of the shaft 20 to the plate 26, whereon the record disk 27 is 20 fixed. The several parts of the driving mechanism are so proportioned to each other, that four turns of the shaft 7 produce three hundred revolutions of the shaft 20 (and of the plate 26 and disk 27) which 25 is considered sufficient for the playing of all records of the ordinary size.

The speed regulating device is shown in Figs. 2 and 4, and is constructed as follows: A stationary collar 33 is fixed to the shaft 30 20, and a sliding collar 34, connected to the stationary collar 33 by flexible links 35, made of tempered springs or in the form of toggle joints, is slidably mounted on the flanged stationary sleeve 37. The weights 35 36 are secured to the links 35 approximately midway between their ends, or in the apexes of their pivotal joints. The extent of the sliding motion of the collar 34 is limited by the flange 38 on the stationary sleeve 37, 40 with which the collar 34 comes in frictional contact when, by the rotating of the shaft 20 and the centrifugal force thus on the weights 28, the joints of the links 35 are drawn out.

45 For varying the tempo in playing diverse records a brake mechanism is connected with the indicator 39, mounted on the top plate of the box of the machine. This brake mechanism is shown in enlarged detail in Fig. 5, 50 and comprises the flanged pulley 40, fixed to the shaft 20, the screw-threaded stem 41, to which the brake arms 42 are connected as shown in the aforementioned Fig. 5, and the interiorly screw-threaded sleeve 43, 55 which is rotatably set in the plate 44, secured to the top plate 14 of the box of the machine, and is held by it against vertical movement. The pointer 39 is integral with the sleeve 43, or rigidly fixed thereto, and, 60 by turning the sleeve 43, the stem 41, which is in screw-threaded engagement therewith, but held against turning by the engagement of the brake arms 42 between the flanges of the brake pulley 40, is raised or lowered 65 correspondingly, according to in which di-

rection the sleeve 43 is turned. For better convenience a knob 45 is formed on the upper end of the sleeve 43, and the letters "S" and "F" are engraved on the plate 44 indicating "slow" and "fast" respectively, and 70 the pointer 39 shows in which direction the sleeve 43 (or knob 45) is to be turned, when slower or faster playing is desired. The brake arms 42 contact with the face of the brake pulley 40, more so when the sleeve 43 75 is turned to the left (toward the letter S) the stem 41 being thereby projected from the sleeve, to exert a stronger braking action. When the sleeve 43 is turned to the right (toward the letter F) the stem 41 is receded 80 into the sleeve 43, and the pressure of the brake arms 42 on the pulley 40 is released.

The mechanism for stopping the plate 26 (and the record disk 27 fixed thereon) when the record is played out, is devised for the 85 purpose of effecting a gradual stopping of the mechanism, and to prevent a shock and the attendant vibration, which would otherwise occur in consequence of abruptly stopping its motion. This stopping mechanism 90 is constructed as follows:

A crank lever 46 is pivoted on stud 47, secured to the top plate 14 of the box of the machine, as shown in Fig. 3. One arm of this lever 46 is shaped to receive the fric- 95 tional block 48, preferably made of rubber, and the arm is shaped, and the pivot 47 so located, that the frictional block 48 may be moved to and from the periphery of the plate 26 by a comparatively short motion of the other arm of the crank lever 46. A second bell crank lever 49 is pivoted at 50 in the lug 51, affixed to the underside of the plate 14, and one arm of this lever 49 projects through the slot 52, provided in the 105 plate 14, and also in the top plate 53 (see Fig. 3). This arm of lever 49 contacts with the longer arm of lever 46, as shown in Figs. 1 and 3. The other, horizontally disposed arm of the lever 49 is pivotally connected 110 with the rod 54, (see Fig. 1) terminating into a treadle or abutment 56. Rod 54 passes through the bore 55 of the weight 28, and when the weight 28, sliding on the rod 54, comes in contact with the treadle 56 at the 115 end of its descent, it acts on the treadle 56 and then the rod 54 pulls down the horizontal arm of the bell crank lever 49 against the resistance of the spring 57. Thereby the vertical arm of the lever 49, projecting 120 through the slot 52, pushes against the longer arm of lever 46 and the frictional block 48 is moved toward, and pressed against, the periphery of the disk 26. The length of the rod 54 is so calculated that 125 the action of the weight 28 on the treadle 56 will be exerted gradually and to its full extent, before the treadle 56 is depressed to the level of the partition 15 of the box, and consequently, also the pressure of the 130

friction block 48 on the periphery of the disk 26. Thereby a gradual and complete stopping of the actuating mechanism and of the disk 26 is effected before the motor is run down entirely. Springs 57 (see Fig. 1) and 58, connecting respectively the arms of the levers 49 and 46 to the fixed pins 60 and 61, maintain also the lever 46 in the position shown in Fig. 3 (away from the periphery of the plate 26) and raise the treadle 56 from the bottom plate 15 of the box of the machine, when the driving mechanism is again wound up, as explained above. The springs 57 and 58 counteract, to a sufficient extent, the action of the weight 28 upon the treadle 56, whereby the retarding action of the friction block 48 upon the periphery of the plate 26 is graduated. They thus assist in effecting the above explained purpose of the stopping device. When the weight 28 is raised from the treadle 56, the springs 57 and 58 raise the treadle 56 and return the bell crank levers 46 and 49 to their normal position, withdrawing the friction block 48 from the periphery of the disk 26, which is then free again to rotate, when the driving mechanism is set in operation, as above described.

I claim as my invention:

1. A driving mechanism for talking machines, comprising a motor operated by a weight; a stud rotatably mounted in the top plate of the box of the talking machine, means operatively connecting the stud with the motor, and a support for securing a record disk thereto; a stopping device mounted on the top plate of the box in position to engage the support of the record disk, and means for operating the stopping device by the weight which actuates the driving mechanism before the motor is run down; substantially as herein shown and described.

2. A driving mechanism for talking ma-

chines, comprising a motor operated by a weight; a stud rotatably mounted in the top plate of the box of the talking machine; a plate fixed thereon; a bell crank lever fulcrumed on the top plate of the box in position to engage the plate affixed to the stud; means for yieldingly holding the lever away from the plate, and automatic means, actuated by the weight operating the motor, for moving the lever and pressing it against the edge of the plate mounted on the stud, immediately before the motor is run down; substantially as herein shown and described.

3. The combination with the driving mechanism for talking machines, designed to be actuated by a weight, of stop mechanism for the rotatable support of the disk, the stop mechanism comprising a bell crank lever pivoted to the top plate of the box of the machine in proximity to the rotatable support, whereon the record is secured; a frictional block secured to one arm of the bell crank lever; a slot in the top plate of the box, a lug affixed to the underside of the top plate adjoining the slot; a bell crank lever pivoted in the lug and having one arm projecting through the slot to engage the other arm of the bell crank lever mounted on the top plate; a rod pivotally connected to the other arm of the bell crank lever; an abutment on the other end of the rod, in position to be engaged by the weight, and springs connected to the arms of the levers and set to draw the levers into their normal position, in which the friction block is withdrawn from contact with the rotatable disk support, when the weight acting on the abutment is raised; substantially as herein shown and described.

HELLMUTH ROSENBAUM.

Witnesses:

PAULA BATES,  
LOUISE KELLER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."





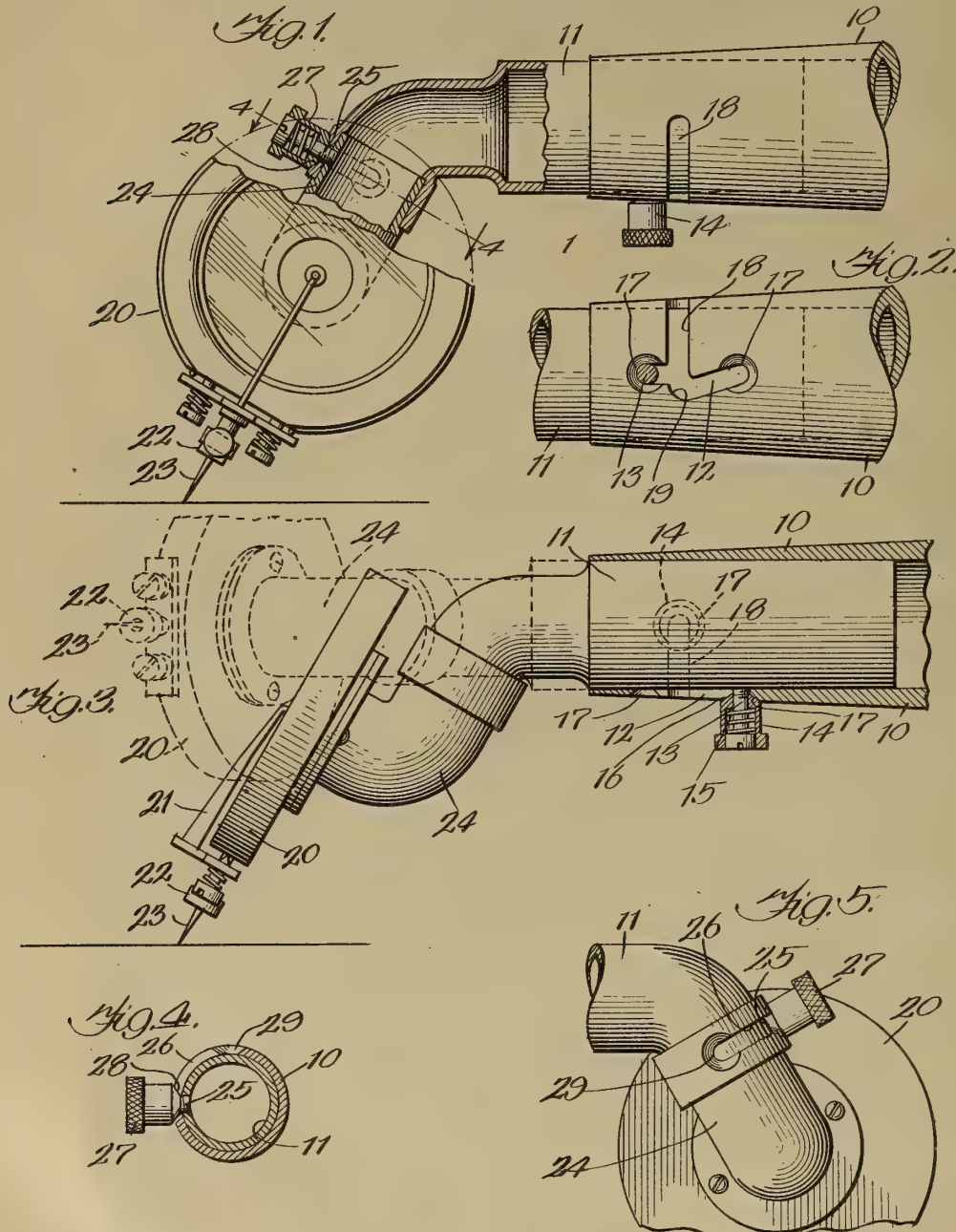


SOUND-REPRODUCING MACHINE,  
#1,231,435-----Henry T. Schiff,  
Patented-June 26th, 1917.  
Filed-January 18th, 1917.

H. T. SCHIFF.  
SOUND REPRODUCING MACHINE.  
APPLICATION FILED JAN. 18, 1917.

1,231,435.

Patented June 26, 1917.



INVENTOR.  
*Henry T. Schiff.*  
BY *J. Jochum Jr.*  
ATTORNEY.

# UNITED STATES PATENT OFFICE.

HENRY T. SCHIFF, OF CHICAGO, ILLINOIS.

SOUND-REPRODUCING MACHINE.

1,231,435.

Specification of Letters Patent.

Patented June 26, 1917.

Application filed January 18, 1917. Serial No. 142,986.

*To all whom it may concern:*

Be it known that I, HENRY T. SCHIFF, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sound-Reproducing Machines, of which the following is a specification.

This invention relates in general to improvements in sound reproducing machines, but more particularly to the tone arm and reproducer box therefor, and one of the objects of the invention is to provide an improved construction in which the sound box may be readily adjusted to properly position the needle or stylus for use according to the character of the sound vibrations in the grooves of the particular record to be used, that is, whether the vibrations in the groove are of the vertical or lateral type.

A further object is to provide improved means whereby the length of the tone arm may be varied and so maintained, when the sound box is positioned for use with the different types of records, to compensate for the change in the distance of the end of the needle or stylus from the pivotal axis of the tone arm, as the sound box by such adjustment turns about an axis inclined to the axis of the tone arm.

To the attainment of these ends and the accomplishment of other new and useful objects as will appear, the invention consists in the features of novelty in substantially the construction, combination and arrangement of the several parts hereinafter more fully described and claimed and shown in the accompanying drawing illustrating the invention and in which:

Figure 1 is a side view partly in elevation and partly in section of a tone arm constructed in accordance with the principles of this invention and having the sound box and stylus or needle arranged in one position with respect to the arm.

Fig. 2 is a detail bottom plan view of a portion of the tone arm, showing the slot to permit longitudinal adjustment of the tone arm.

Fig. 3 is a view in vertical longitudinal section of the parts shown in Fig. 1, with the sound box and stylus in position with respect to the tone arm, for use with another type of record. The sound box is shown in

dotted lines in position to permit the needle or stylus to be removed.

Fig. 4 is a detail sectional view on line 4-4, Fig. 1.

Fig. 5 is a detail side elevation of the sound box showing its connection with the tone arm and as taken opposite to the side shown in Fig. 1.

Referring more particularly to the drawing, the numeral 10 designates a portion of the main section of a hollow tone arm and telescoping with the end of the main section is a hollow supplemental section 11 which is adapted to slide longitudinally in the section 10 and also to be rotated within the section. The main section 10 is provided with a groove designated generally by the reference numeral 12. This groove extends in a general direction lengthwise of the tone arm and is slightly inclined with respect to the axis of the arm. Connected with the supplemental section 11 is a pin or projection 13 having a portion 14 in the form of a cap which is yieldably connected by means of a spring 16 with the pin 13. This pin projects through the slot 12 and is adapted to move therein, while the yielding cap or portion 14 is located on the outside of the arm. The portion 14 is provided with a tapered extremity 16 adapted to be seated in a seat 17 at the end of the slot 12.

The slot 12 is provided with a laterally projecting portion 18 which has communication with the slot 12 and is adapted to receive the pin 13 when the supplemental section 11 is properly positioned with respect to the main section 10 and when the supplemental section is rotated for a purpose hereinafter set forth.

The slot 12 being inclined to the longitudinal axis of the main section 10, will cause a slight rotary movement to be imparted to the supplemental section during its longitudinal adjustment and when the supplemental section is moved in a direction to extend the tone arm, the pin 13 will engage a shoulder 19 which is formed to project into the path of movement of the pin in the slot 12. This shoulder 19 is located in a position that when the pin 13 contacts therewith, the pin will be properly positioned in alinement with the laterally projecting portion 18 of the slot to direct the pin into the slot when the supplemental section is ro-



tated. The partial rotation of the supplemental section during the extending of the tone arm, will also assist in directing the pin into the portion 18 of the slot.

5 Obviously seats similar to the seats 17 may be arranged at desired points in the slot so that the yielding portion 14 of the pin will be seated therein and serve as a means for yieldingly locking the parts in adjusted positions.

10 The sound box 20 is provided with the usual stylus lever 21 having a portion 22 adapted to receive the stylus 23. This sound box is provided with a tubular portion 24 which telescopes with the free end of the supplemental section 11 of the tone arm so that the sound box may be rotated with respect to the tone arm and moved from the position shown in Fig. 1 to the position shown in Fig. 3 and vice versa, to position the stylus according to the type of record to be used.

15 The sound box may be connected with the supplemental section of the tone arm in any suitable manner but preferably by means of a pin 25 which is fastened to the tubular portion 24 and passes through a slot 26 in the supplemental section. This pin 24 is preferably provided with a yielding portion 27 having a bevel face 28 adapted to enter seats 29 at the ends of the slot 26 for yieldingly locking the sound box in its adjusted position.

20 It will therefore be manifest that when the sound box 20 is adjusted from the position shown in Fig. 1 to the position shown in Fig. 3 with respect to the tone arm, the distance of the end of the needle or stylus from the pivotal axis of the tone arm will be varied, as the sound box by such adjustment will turn on an axis inclined to the axis of the tone arm. In order to compensate for this change in the distance, it is necessary to adjust the length of the tone arm and this is accomplished by means of the pin and slot connection 12, 13.

25 When the sound box is in the position shown in Fig. 1, the tone arm must be extended, that is so that the pin 13 will be in the forward end of the slot 12 but when the sound box is in the position shown in Fig. 3 in full lines, the pin 13 must be located at the inner end of the slot 12.

30 The laterally projecting portion 18 of the slot is provided as a means whereby the sound box may be moved into the dotted line position shown in Fig. 3 so as to permit the withdrawal and the insertion of the stylus 23 in the stylus holder 22.

35 The yielding portion of the pin 13 temporarily locks the parts in their adjusted position and the shoulder 19 of the slot 12 will direct the pin 13 into the portion 18 of the slot, while the inclined portion of the slot itself will impart a slight rotary move-

ment to the supplemental section during the longitudinal adjustment of the parts so as to move the pin 13 into a position that it will engage or abut the shoulder 19.

What is claimed as new is:—

70 1. In a sound reproducing machine, a tone arm embodying telescoping sections, one of said sections having a slot extending in a general direction lengthwise of the arm, there being a laterally extending slot in said part communicating with the first said slot, a pin on the other section of the arm and adapted to operate in the first said slot to permit longitudinal adjustment of the sections, a portion of the first said slot intermediate its ends being shaped to arrest the longitudinal adjustment of said section and to impart a slight relative rotary movement to the section during longitudinal adjustment, to direct the pin into the said lateral slot.

80 2. In a sound reproducing machine, a tone arm embodying telescoping sections, and a pin and slot connection between the sections to permit longitudinal adjustment thereof, there being a lateral branch communicating with the slot, intermediate the ends of the slot, the wall of one of the slots being shaped to position and direct the pin into the lateral branch of the slot when the sections are longitudinally adjusted.

95 3. In a sound reproducing machine, a tone arm embodying a main section, a supplemental section telescoping therewith and rotatable with respect thereto, a pin on one of the parts, the other part having a slot to receive the pin, said slot having a portion to permit longitudinal adjustment of the parts and a laterally extending portion communicating therewith to receive the pin to permit rotary adjustment of the parts, one of said parts having means intermediate the ends of the slot for arresting the longitudinal adjustment of the parts and operating to position the pin to enter the laterally extending portion of the slot, and a sound box rotatably connected with the said supplemental section.

100 4. In a sound reproducing machine, a tone arm embodying a main section, a supplemental section telescoping therewith and rotatable with respect thereto, a pin on one of the parts, the other part having a slot to receive the pin, said slot having a portion to permit longitudinal adjustment of the parts and a laterally extending portion communicating therewith to receive the pin to permit rotary adjustment of the parts, there being means intermediate the ends of the longitudinal portion of the slot for arresting the longitudinal adjustment of the parts and operating to position the pin to enter the laterally extending portion of the slot, a sound box rotatably connected with the said supplemental section, and

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means for holding the sound box in its adjusted position with respect to the said supplemental section.

5 5. In a sound reproducing machine, a tone  
arm embodying a main section, a supple-  
mental section telescoping therewith and  
rotatable with respect thereto, a pin on one  
of the parts, the other part having a slot  
to receive the pin, said slot having a por-  
10 tion to permit longitudinal adjustment of  
the parts and a laterally extending portion  
communicating therewith to receive the pin  
to permit rotary adjustment of the parts,  
means intermediate the ends of the longi-  
15 tudinal portion of the slot for arresting the  
longitudinal adjustment of the parts and  
operating to position the pin to enter the  
laterally extending portion of the slot, a  
sound box rotatably connected with the said  
20 supplemental section, and a pin on one of  
the parts, the other part having a slot to  
receive the pin to limit the rotary move-  
ment of the sound box with respect to said  
supplemental section, said pin having a  
25 yielding portion, and said slot having seats  
to temporarily receive said yielding por-  
tion.

6. In a sound reproducing machine, a tone  
arm embodying a main section, a supple-  
30 mental section telescoping therewith and ro-  
tatable with respect thereto, a sound box  
pivotally connected with the said supple-  
mental section for adjustment into two  
operative positions with respect to the said  
35 supplemental section, said sections being  
provided one with a projection and the  
other with a slot to receive the projection  
for limiting the longitudinal adjustment  
of the sections, said slot having a laterally  
40 extending portion communicating therewith  
to receive the projection to permit the sup-  
plemental sections to be rotated with respect  
to the main section, and a shoulder interme-  
diate the ends of the first said portion of  
45 the slot and extending into the path of  
movement of the projection in said slot to  
position the projection to enter the laterally  
projecting portion of the slot.

7. In a sound reproducing machine, a tone  
arm embodying a main section, a supple-  
50 mental section telescoping therewith and  
rotatable with respect thereto, a sound box  
pivotally connected with the said supple-  
mental section for adjustment into two  
55 operative positions with respect to the said  
supplemental section, said sections being  
provided one with a projection and the  
other with a slot to receive the projection  
for limiting the longitudinal adjustment of  
60 the sections, said slot having a laterally ex-  
tending portion communicating therewith  
to receive the projection to permit the sup-  
plemental sections to be rotated with respect  
to the main section, and a shoulder disposed  
65 intermediate the ends of the longitudinal

portion of the slot and extending into the  
path of movement of the projection in said  
slot to position the projection to enter the  
laterally projecting portion of the slot, the  
said slot being shaped to impart a slight ro- 70  
tary movement to the said supplemental sec-  
tion during the longitudinal adjustment  
thereof.

8. A tone arm for sound reproducing ma-  
chines, embodying a main section, a supple- 75  
mental section telescoping therewith and ro-  
tatable with respect thereto, a pin on one  
of the parts, the other part having a slot  
to receive the pin to permit longitudinal  
adjustment of the parts, said slot having a 80  
lateral branch, and a shoulder arranged in  
the path of movement of the pin to position  
the latter to enter the lateral branch, said  
shoulder being disposed intermediate of and  
spaced from the ends of the slot. 85

9. A tone arm for sound reproducing ma-  
chines, embodying a main section, a supple-  
mental section telescoping therewith and ro-  
tatable with respect thereto, a pin on one  
of the parts, the other part having a slot 90  
to receive the pin to permit longitudinal ad-  
justment of the parts, said slot having a  
lateral branch, and a shoulder arranged in  
the path of movement of the pin to position  
the latter to enter the lateral branch, said 95  
shoulder being disposed intermediate of and  
spaced from the ends of the slot, said slot  
being shaped to impart a slight rotary  
movement to the supplemental section when  
the parts are longitudinally adjusted. 100

10. A tone arm for sound reproducing  
machines, embodying a main section, a sup-  
plemental section telescoping therewith and  
rotatable with respect thereto, a pin on one  
of the parts, the other part having a slot to 105  
receive the pin to permit longitudinal ad-  
justment of the parts, said slot having a  
lateral branch, and a shoulder arranged in  
the path of movement of the pin to position  
the latter to enter the lateral branch, said 110  
shoulder being disposed intermediate of and  
spaced from the ends of the slot, said pro-  
jection embodying a yielding portion, and  
said slot having an open seat to receive the  
said yielding portion. 115

11. A tone arm for sound reproducing  
machines, embodying a main section, a sup-  
plemental section telescoping therewith and  
rotatable with respect thereto, a projection  
on one of the parts, the other part having 120  
a slot to receive the pin to permit longitu-  
dinal adjustment of the parts, said slot ex-  
tending in a general direction lengthwise of  
the longitudinal axis of the arm and in-  
clined with respect thereto, said slot having 125  
a lateral offset portion to receive the said  
projection when the said supplemental sec-  
tion is rotated, and a shoulder arranged in-  
termediate the ends of the longitudinal por-  
tion of the slot to extend into the path of 130

movement of the projection in the main portion of the slot to arrest the longitudinal adjustment of the parts and position the projection to enter the laterally off set portion of the slot.

12. In a sound reproducing machine, a tone arm embodying telescoping sections, and a pin and slot connection between the sections to permit longitudinal adjustment thereof, there being a lateral communicating branch to the slot intermediate the ends of the slot, there being means coöperating with the said pin to arrest the longitudinal adjustment of the sections and to position the pin to enter the lateral slot to permit a relative rotary adjustment of the sections.

13. In a sound reproducing machine, a tone arm embodying telescoping sections, and a pin and slot connection between the sections to permit longitudinal adjustment thereof, there being a lateral communicating branch to the slot intermediate the ends of the slot, there being means coöperating with the said pin to arrest the longitudinal adjustment of the sections and to position the pin to enter the lateral slot to permit a relative rotary adjustment of the sections, said pin having a yielding portion adapted

to yieldingly enter a seat in the other section.

14. In a sound reproducing machine, a tone arm embodying telescoping sections, and a pin and slot connection between the sections to permit longitudinal adjustment thereof, there being a lateral communicating branch to the slot intermediate the ends of the slot, there being means coöperating with the said pin to arrest the longitudinal adjustment of the sections and to position the pin to enter the lateral slot to permit a relative rotary adjustment of the sections, said pin embodying a body, a portion slidable upon the body, and an elastic element disposed between the said portion and the body of the pin, there being an open seat on the other section of the arm adapted to yieldingly receive the said slidable portion of the pin.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 16th day of January, A. D. 1917.

HENRY T. SCHIFF.

Witnesses:

IRMA M. BARING,  
J. H. JOCHUM, Jr.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."











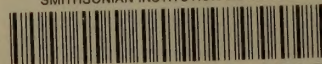








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